

AI Sustainable Development Report 2021-2022

AI Ethics for Balanced Development



To create a better AI-empowered future through innovation

To advance the interconnection of the physical and digital worlds with artificial intelligence,
driving sustainable productivity growth and seamless interactive experiences.

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ABOUT SENSETIME



As a leading artificial intelligence (AI) software company, SenseTime's mission is to create a better AI-empowered future through innovation and to advance the interconnection of the physical and digital worlds with artificial intelligence, driving sustainable productivity growth and seamless interactive experiences to ultimately create a better world. The vision of "Combining virtual reality with life experience" enables SenseTime to continue leading the frontier of AI research and build a more expansive and inclusive software platform, while also promote economic, social and human development and to attract and cultivate top talents, while shaping the future together.

SenseTime has accumulated deep academic expertise and committed long-term investment in original technology research, continuously enhancing its industry-leading full-stack AI capabilities, covering key technical fields such as perception intelligence, decision intelligence, intelligent content generation, intelligent content enhancement, as well as the company's key capabilities, including AI chips, AI sensors, and AI computing power infrastructure. In addition, SenseTime has had the foresight to create a new type of AI infrastructure-SenseCore. It is a large-scale platform integrating computing power and algorithms, which reduces the cost of major AI development factors. It helps SenseTime to achieve mass production of high-efficiency and low-cost AI innovations and applications while opening up the closed-loop of commercial value, solve the long-tail application problem, and propel AI onto the stage of broad industrialization.

SenseTime's business covers four major areas: Smart Business, Smart City, Smart Life, and Smart Auto, its related products and solutions are well received by customers and partners. SenseTime has established offices in Hong Kong, Shanghai, Beijing, Shenzhen, Chengdu, Hangzhou, Nanping, Qingdao, Sanya, Xi'an, Taipei, Macau, Kyoto, Tokyo, Singapore, Riyadh, Abu Dhabi, Dubai, Kuala Lumpur, Seoul and other places office. The company also has operations in Thailand, Indonesia, the Philippines and other countries.

For more information, please visit SenseTime's website, WeChat, Weibo and LinkedIn.

ABOUT THIS REPORT

SenseTime Group Inc. (hereinafter referred to as "SenseTime", "Company" or "Us") is taking the initiative to report the company's latest development on sustainable AI to the public, aiming to enhance public understanding on SenseTime's sustainable development effort and invites everyone to monitor its progress.

SenseTime publishes this report to illustrate the company's best practices in sustainable AI development and promotes understanding, communications and interactions with key stakeholders and the public, helping to realize the sustainable mission of the company.

This report is compiled with reference to the core "conformity" program of the Global Reporting Initiative (GRI) standards. To ensure the reliability, fairness and transparency of the report, the company has hired an external agency BV to verify and issue an independent report. The verification report (to be prepared).

The Chinese version of this independent report was published earlier in 2021, divided into print and electronic version. To read or download the full report, please visit: <https://www.sensetime.com/en/ethics>

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Part 1

Overview

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Human civilization's self-discipline and altruism in AI

—Towards a balanced development of AI ethics

The core ethos of science is to seek truth and build technology for the good of mankind. The famous Chinese scientist Qian Xuesen once said that: "As a scientist, my purpose in life is to serve the people." Similarly, Joseph Needham, a British biochemist and historian in science, expressed the same sentiment when he said: "For scientists, the unsurpassable principle is to serve the people and human civilization". In view of this, the responsibility of AI practitioners is to promote AI research for the benefit of all mankind, and join hands with the global community to practice AI responsibly. The idea is to achieve peer-to-peer supervision, a balanced ecological civilization and sustainable AI for all sectors of the society.

1.1 Changes in Human Ethics: From "Machine Learning" to "Machine Ethics"

Advancements in computing has led to a "Cambrian explosion" of data and transformed AI data into invaluable knowledge. Moore's Law has brought about a series of chain reactions, including the information revolution (Internet), computing revolution (cloud computing), media revolution (digital video), and the outcome is the exponential growth of big data that is equivalent to the creating a whole new category of global production materials that is virtually inexhaustible and can be manufactured day and night.

This explosive growth in the means and sources of production resource in the form of data has brought about new technological changes in productivity. During the first industrial revolution, the continuous transportation of raw cotton and iron ore from all over the world to the United Kingdom, led to a bottleneck from the limitations of manual labor. This critical issue accelerated the invention of the steam engine. Likewise, the exponential growth of big data emerged from the internet, industrial internet, internet-enabled vehicles, the internet of things. Today this has created a bottleneck in the efficiency of artificial knowledge extraction and transformation, which have accelerated the birth of artificial intelligence.

Table 1: Automated process of data "knowledge"

Knowledge from data	Industrial age	Information age	Internet age	AI age
Data collection	Human labor	Human labor	Partially automated	Fully automated
Data storage	Human labor	Partially automated	Fully automated	Fully automated
Knowledge extraction	Human labor	Human labor	Partially automated	Fully automated
Business optimization	Human labor	Human labor	Human labor	Fully automated

The current new generation of artificial intelligence (AI) technology has empowered a significant step forward human perception, cognition, and decision-making paradigms, and sparked a wave of transformative technological innovation. This has coincided with the continued human dependence on technology which has resulted in today's unprecedented level of influence held by technology today. These advances in AI have raised the prospect of machines one day fully simulating human intelligence and cognitive power. Which raises the major question of when we use AI to aid innovation and decision-making, given AI is created from human input and data that still features some elements of human bias are we naturally imbuing our own human values into the development and use of this technology? The consensus is that for AI to be trusted, fair and ethical, the whole process of machine learning and development of AI should be supervised by humans but operating under strict and very clear guidelines. For example, when we consider approving a loan, information recommendations and social network reviews are conducted according to default ethical standards that are applied in that scenario. Another example is the autonomous driving model generated from hundreds of thousands of human driver experiences and the total know-how. Big data is used to replace human expertise, different values such as road safety and driver's ethics for pedestrians have had an impact on AI training which guide autonomous driving car models run through virtual cities and highways for simulation testing, which is to replace artificial inference and deduction with simulation. The desire is to enhance the speed of innovation, reduce costs from trial and error, and test long-tail scenarios with many unknowns and variables. Vehicle and pedestrian safety are also involved, while animal safety, environmental safety and other ethical standards are also considered as factors. It is true that the human brain is performing hundreds of "calculations" per second, with a total of 1.5 trillion calculations per second (1.5x10¹⁸), which is equivalent to the current capacity of 100,000

GPUs. Humans should always be in the loop to supervise the values and hidden risks of AI technologies from design to obsolescence. As with all major technological advances in history the question of ethics is one that must always be considered. Those responsible for developing new technologies must also be responsible for ensuring that they protect against the misuse of technology and devise common principles to guide new advances and applications in technology that ultimately benefit society. In the basic scientific research and industrial R&D journey of humans exploring today's AI systems we must be guided by an emerging AI ethics framework and process which both adheres to and continues to evolve the "technology or machine ethics" risk management mechanism.

Table 2: Human cognition and ethics paradigm

	Deduction	Reasoning	Estimation	Ethics
Human cognition	1. Empirical deduction	2. Inference deduction	3. Intuitive inspiration	4. Human ethics
Machine cognition	5. Big data reasoning	6. Simulation conjecture	7. Machine conjecture	8. Machine ethics

1.2 Seeking common ground in the ethics of different civilizations: the artificial intelligence ethics of "balanced development"

At a time when AI has emerged at the leading frontier of technological innovations, the basic concept of humanistic principles should be prioritized. Scientists should value and uphold the existence of the trinity of humanities, science, and art, and the supreme wisdom of mankind is not invention, but conscience. The human spirit, rather than scientific research, is the critical key to open the door to our future. Based on these foundations, we collected and analyzed all AI ethics policies, initiatives and standards around the world, and deconstructed into three categories. First, the "Sustainability" category which covers environmental protection-promoting peace and tolerance, resource sharing, open collaboration, social awareness, as well as agile governance. Regarding governance and other developmental principles, the "Human-Centric Approach" category covers the protection of human rights and privacy, human resources management, ensuring fairness and non-discrimination, and increasing benefits for humanity. The "Controllable Technology" category covers verifiable, manageable, legal, and trustworthy, explainable, safe and reliable, open and transparent, and other technical responsibility principles. Specific countries, regions, and international organizations have become the main actors, and the additional policies, guidelines and standards on related topics have been released as shown in the figures below, represented by the dots on the radar chart, which gives us an understanding of the current trends.

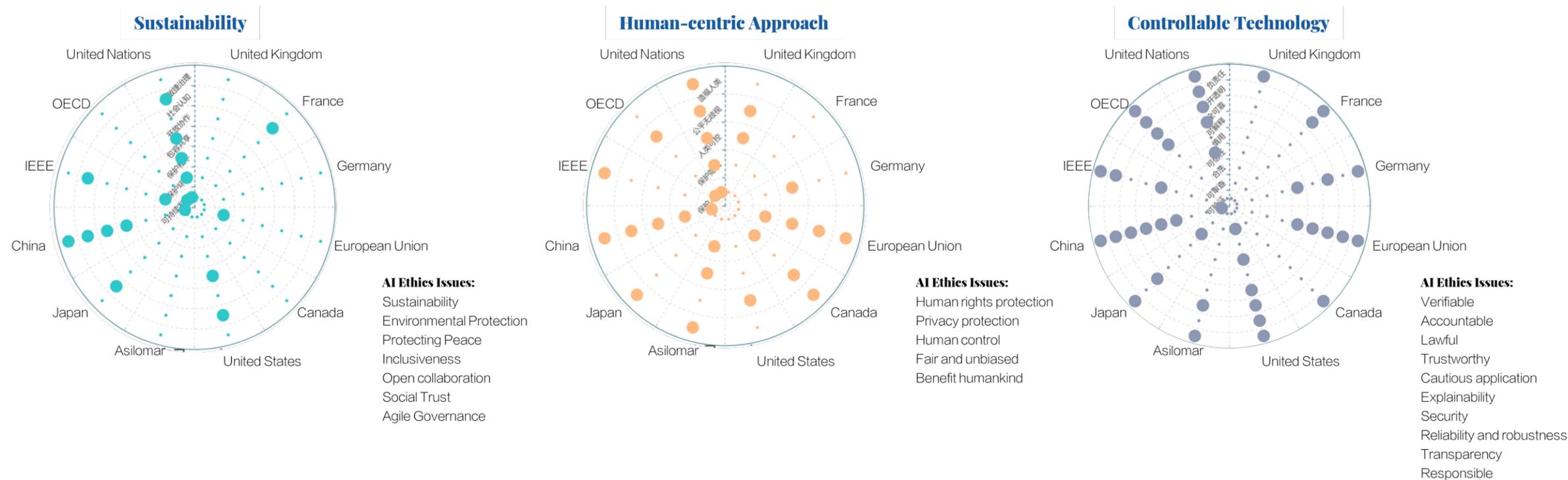


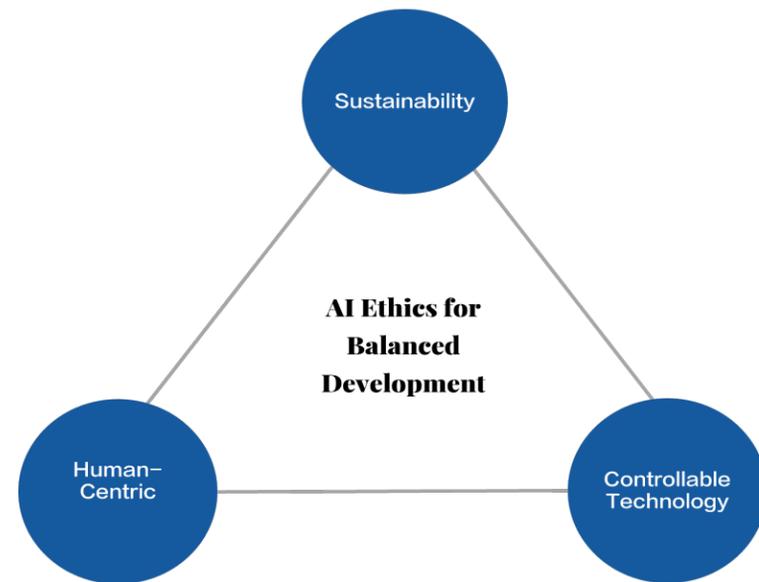
FIGURE 1: Theoretical Perspective on Balanced AI Ethics Development

First, AI ethics should be linked with human values.

Turing Award winner Yann LeCun said in his book "The Road to Science: Man, Machine and the Future": "AI ethics is a question of consistency between the value of a machine and the universal values of mankind." Over the past few millennia, mankind has gradually codified our moral value systems into laws. By educating the younger generation to distinguish between diverse sources of social ethics, modern humans are now able to deal with abstract moral values across a wide range of scenarios from daily life to the development and application of AI algorithms, data and computing power. However, when we approach codifying moral values to into systems and technology it is impossible to process the same volume of daily life scenarios within a short period of time. So to ensure modern AI systems can be trusted and relied upon to take action across a whole range of long-tail scenarios that could emerge in the example of smart city technology, there is an acceptance that agile governance based on case law should be adopted as a solution. The principles continue to supplement and improve the evolving AI ethics system to be more aligned with our universal-agreed human ethics system. Therefore, an overview of AI ethics policies, initiatives, standards, and regulations of all countries, regions and institutions around the world is necessary in order to find the "Sustainability", "Human-Centric", and "Controllable Technology" that have formed the pillars of AI ethics which are consistent with human values.

Second, we should pursue the common development of "universal values" for the benefit of mankind.

In the book "The Clash of Civilizations and the Remaking of World Order", Harvard professor Samuel Huntington divided the world into eight major civilizations, including Chinese, Japanese, Indian, Islamic, Eastern Orthodox, Western, Latin American and African. Since 2020, all humans represented by these eight major civilizations have faced extreme shared challenges, such as extreme heat, wildfires, floods, hurricanes, the COVID-19 pandemic and other natural disasters. Based on the common development concept of "innovation, coordination, green development, openness, and resource sharing", the world has become more unified while values co-existence and realizing social harmony. The world view will surpass the civilization-level view of global and societal affairs, and the human well-being perspective will surpass the national interests view. All countries join hands to undertake the development mission and pursue responsible innovations for the sake of creating a "community of common destiny for all mankind". While AI ethics should evolve based on the goal of balanced development which best reflects the universal value demands of all humanity.



Picture: AI Ethics for Balanced Development

Finally, a balanced and inclusive set of AI ethics is a key driving force for the survival and development of the human race.

The growth of economic strength can in deed greatly enhance the self-confidence of regional civilizations and create the illusion that "the world is centered on my region", but there has never been one single path forward for civilizational progress in human history, but rather a plethora of different civilizations forging their own unique and sometimes intermingling paths. The famous British historian Arnold Toynbee stated in "A Study of History " that "Morality appears in the biosphere at the same time as consciousness, and the two together constitute a form of existence, that is, a spiritual form," "even a well-developed civilized person is still like a primitive man, He is a prisoner of his own time and place." The integration of civilization, culture, population, economy and language has brought a diversified view of social ethics. Mapping modern social ethics to AI ethics forms a new ethical standard that adapts to local conditions while also balancing countries at different stages of development. This new standard and framework ensures balanced and ethical AI by following the three principles of "Sustainability" (developing countries), "Human-Centric" (developed countries), and "Controllable Technology" (science and technology-led countries). These principles drive human civilization to embark on an innovative, coordinated, green, open, and shared sustainable development path for AI.

1.2.1 The Principle of Sustainability: The right to development is the greatest social responsibility

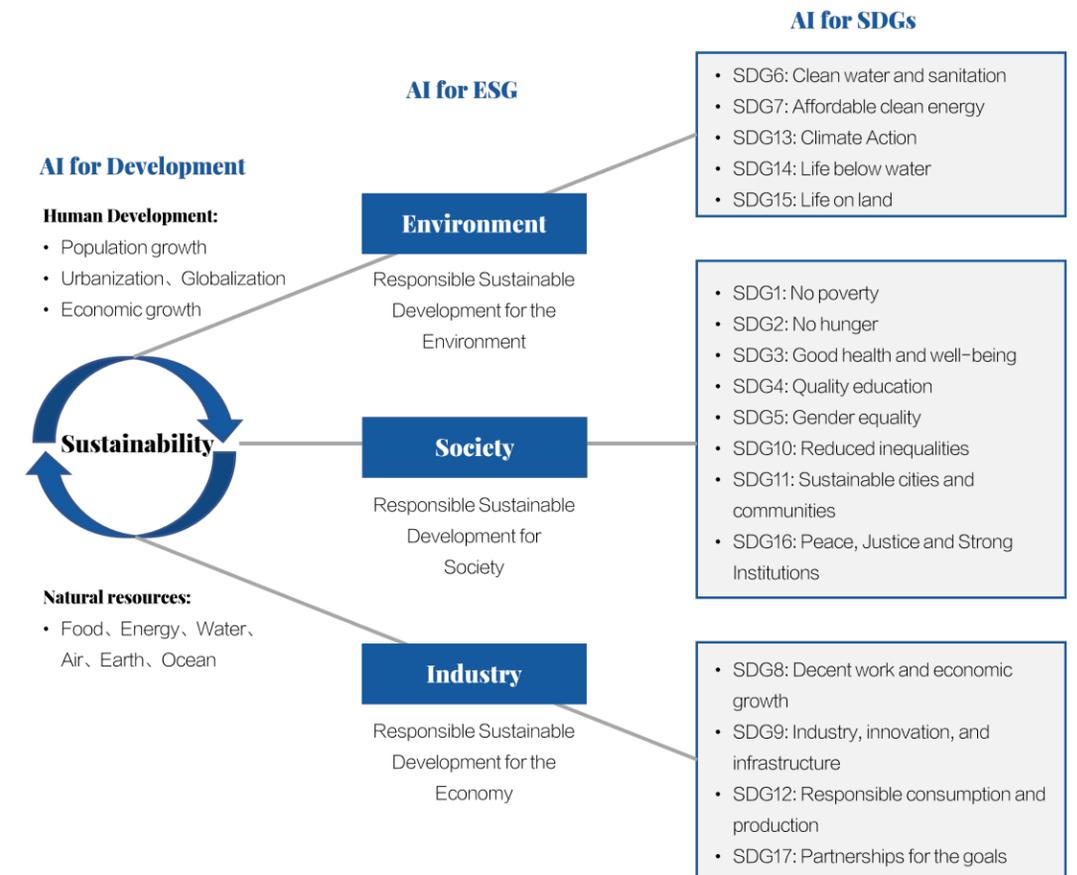


Figure2: Sustainability

First, the sustainable development of industry, society, and the environment is the greatest corporate social responsibility goal that the world is facing.

In the 19th century, American geographer and ecologist George Perkins Marsh pointed out in the his book "Man and Nature" that "The earth not only affects people, but also affects the earth. Humans should stop treating nature purely based on their own immediate interests and should focus on building a sustainable planet inhabited by future generations. Together, we can sharply reduce excessive environmental destruction, protect nature, transform nature for sustainability, and make life better for all living creatures." The blueprint of the concept and practice of "Sustainability" has been set. In2019, the United Nations Human Right Council passed a resolution and issued the Declaration on

the Right to Development, confirming that the right to development is an inalienable human right. Modern states around the world today focus national strategies on this fundamental right to development. China in the modern era has provided food and clothing for 1.4 billion people, lifted 850 million people out of poverty, provided employment for 770 million people, prioritized the "right to survival and development" of Chinese society in the pursuit of a better life for all, as well as opened up markets and shared science and technology with developing countries around the world. Productivity gains have driven many developing countries to realize the value of common development and common prosperity of a unified global community with a shared future for all mankind through the construction of a new generation of infrastructure and digital economy ecosystem, and these have pulled off world-class achievements for the people in the world. When countries have reached a deliberate and clear consensus, commercial civilization will evolve in the contemporary era, and ecological civilization will benefit our future generations and create a better world. Every enterprise, government and individual is part of the community of common destiny for all mankind and shoulders the responsibility of ensuring the implementation of a sustainable industrial and societal development. The three inseparable responsibilities of sustainable development and environmental sustainability are the realization of national governance, scientific and technological ethics, as well as industrial development. They are also known as the environmental, social, governance (ESG) corporate social responsibility principles for technology enterprises.

Secondly, technological innovation is the "golden key" for human sustainable development, and the common challenges of human survival and development have accelerated the needs for artificial intelligence solutions to benefit the world.

The earth is facing an existential crisis. The goal of achieving sustainable development for mankind brings all countries together, accelerates scientific and technological innovations, and strives to balance and mitigate the fundamental gap between the infinite development needs of mankind and the limited ecological resources in the earth. Schumpeter Prize winning economist Brian Arthur once said in his work "The Nature of Technology" that: "Technology is the top driving force for major changes in our world." In today's world, humans use newly harnessed energy sources such as wind and hydrogen storage to replace oil. To tackle global climate disasters, AI is being used to detect new coronaviruses, discovering special drugs, developing robots and brain-like computer interfaces to help the disadvantaged groups, as well as using 5G Internet of Things (IoT) and AI remote sensing technology to protect natural resources and wildlife. The 17 United Nations Sustainable Development Goals provide countries guidance on their economic development models, scientific and technological

innovations, and corporate social responsibility developments. On April 22, 2021, the 52nd Earth Day, United Nations Secretary-General António Guterres called on the international community to utilize the recovery process of the COVID-19 epidemic as an opportunity to set the world on a cleaner, greener and more sustainable development path. In order to activate the huge potential of AI, accelerate the realization of the sustainable development goals, and manage scientific and technological risks, the United Nations Department Economic and Social Administration (DESA) and the United Nations Secretariat jointly issued the English version of "Resource Guide on Artificial Intelligence Strategies" in June 2021, which put forward an international appeal for AI ethics, technical governance standards, AI strategic resources and innovation cases in various countries.

Finally, sustainable development relies on an internationalized and inclusive digital economy community of nations.

In June 2019, the United Nations published its "Age of Digital Interdependence" report to propose that the international community should work together to optimize the use of digital technologies and reduce risks, and put forward five recommendations: (1) Build an inclusive digital economy and society; (2) Develop human and institutional capabilities; (3) Protect human rights and human agency; (4) Promote digital trust, security and stability; (5) Foster global digital cooperation. One year later, the United Nations released its "Roadmap for Digital Cooperation", which stated "It is estimated that the use of artificial intelligence will bring nearly US \$4 trillion of added value to the global market by 2022." However, the challenge is that we still need to significantly enhance the "representation and inclusiveness of developing countries in global artificial intelligence discussions". It is therefore important to develop a common set of AI ethics and governance principles based on the 160 publicized sets of principles from around the world, and enable the public sector to effectively deploy and monitor AI systems to achieve the sustainable development goals. Meanwhile, regarding the international scope of digital capacity building (especially for developing countries), digital trust and security, AI security and autonomy, cyberspace protection of vulnerable groups, data security and privacy, anticyber harassment and content governance all need a functional global digital information sharing infrastructure, a distributed common governance infrastructure, and a digital cooperation mechanism comprising members of the Internet Governance Forum. So as to solve the global digital cooperation issues of member states, enterprises, academic institutions and the civil society on matters like AI inclusiveness and global policy goals of coordination and capacity building.

1.2.2 The Principle of Human-Centric Approach: Relief for the poor, tolerant and respect



Picture: Human-Centric

First of all, humans are the key actors for realizing sustainable development, hence AI ethics should be human-centric and help those in need to bridge the "development gap".

According to data from the "Reconstructing the Earth" report, between 2030 and 2050 there will be 9–10 billion people on the planet who require food, clean drinking water, decent and equal employment opportunities, basic levels of income to avoid poverty, gain access to reliable and affordable energy, as well as infrastructure that can withstand environmental degradation. This means that with the current urbanization rate reaching 68%, human demands for food, energy and water will increase by 60%, 80%, and 55% respectively. Currently, 800 million people around the world are suffering from hunger, 2 billion people are malnourished, 1.5 billion people lack access to regular electricity, and 800 million people lack safe drinking water sources. Therefore, it is imperative to use advanced technology to solve these human survival problems. Despite the diverse values embraced by different civilizations in the world, alleviating poverty and helping the poor to improve their livelihoods as well as achieving common prosperity have become "common principles" that transcend individual civilizations.

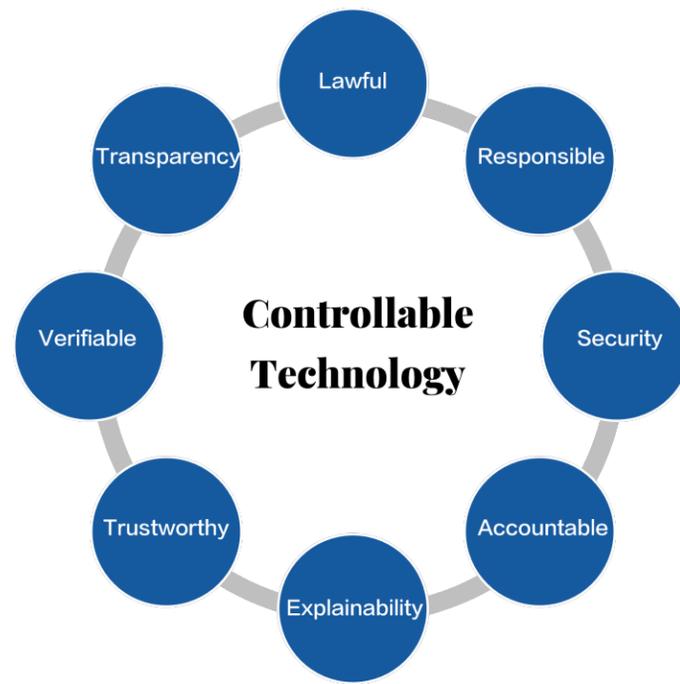
Secondly, respect for the fundamental rights of human beings is at the core of being human-centric and helping communities to cross the "human rights gap".

According to the United Nations Charter and the Universal Declaration of Human Rights, artificial intelligence should protect and promote the basic rights of women, children, the disabled, minorities, disaster victims, the elderly, people with mental illness, the unemployed, and other vulnerable groups, and provide them with privacy protection and avoid algorithmic discrimination. For example, SenseStudy helps young people acquire scientific and technological innovation capabilities and correct ethical values through the K–12 AI basic education course (SenseStudy is an experimental AI online learning platform), and was designed to strengthen the "right to education" during the COVID–19 epidemic; we developed smart obstacle– avoidance glasses to help the visually impaired outdoors. Users trigger voice prompts such as traffic signals and environmental obstacles when walking to protect the "right of freedom of movement" of the disabled. We use the SenseCare chest CT intelligent clinical system to empower critical COVID–19 screening at hospitals in more than 6 Chinese provinces and cities to achieve "second– level automatic screening" and enhance the public's "right to social health".

Finally, inclusive AI ethics should be characterized as being focused on humanistic care and mutual respect as a key to realizing the human-centric principle and bridges the cultural gap.

Canadian Nobel Peace Prize winner Lester Pearson believes that "In an era where different civilizations must learn to live together through peaceful exchanges, learning from each other, studying each other's history, ideas, art and culture, and enrich each other's lives. Otherwise, in this crowded and narrow world, misunderstandings, tensions, conflicts, and disasters will appear." Reaching consensus on AI ethics among civilizations is essential, SenseTime will adapt and optimize the multicultural lens when approaching AI ethics, laws and regulations before launching international products, while also conduct risk assessments regularly and improve based on the global AI ethical dynamics.

1.2.3 The Principle of Controllable Technology: human responsibility and governance



Picture: Controllable Technology

First, AI is an advanced tool developed by and for the benefit humans, therefore its development should be governed and guided by human controls. Ultimately humans should bear the full ethical responsibility for how such powerful and deeply impactful technology is developed and applied. This will deliver trusted AI as human controls ensure the end goal of all AI development should always be focused on the benefit of humans.

Considering tools are unconscious and non-autonomous, the ethical responsibility derived from tools must always fall on humans, which includes AI developers, users and regulators. For example, if a R&D personnel gives an incomplete set of data, it will result in algorithm discrimination due to data deviation or sensitive data collection and leakage due to abuse of application scenarios, and lack of data security. Adam Smith firmly believes in "The Theory of Moral Sentiments" which posits that "The perfection of human nature lies in the consideration of others and less on consideration of ourselves. It lies on restraining our selfishness and at the same time indulging our kindness."

Secondly, AI that can solve problems should be regulated through adoption of an agile, diversified and developmental governance model to fully realise the innovative development potential of science and technology to bring benefits to mankind.

It would be much simpler to assume no ethical risk if AI never existed. But the purpose of governance is not to eliminate a core technology's primary function to help find its true potential. Instead we should adopt a developmental, diversified and agile governance model of "promoting development and ensuring the bottom line" to manage new risks and develop new ideas to solve new problems. Although it still takes time for humans to fully understand machine learning, it is relatively easy to determine the positive and negative impact of AI applications by analyzing its results against universally-accepted social ethics, so even laymen and general users can supervise through multiple domains, enjoy autonomy and develop self-discipline.

The father of Chinese aerospace Qian Xuesen often said that "Knowledge is boundless, nothing is final!" (Human knowledge and cognition never cease to push forward), so human cognition of science and technology must pursue continuous progress and self-subversion. Hence even in cases of the unknown we should continually pursue scientific and technological innovation as long as new technologies can bring clear benefits in times of need or create genuine positive impact on society. Bernoulli's theorem cannot fully explain the cause of the lift generated by an aircraft's wing, but now more than 4 billion people travel by air every year. Agile governance can accelerate scientific research innovations—visual neuroscience has inspired convolutional networks, which helps to explain the functions of visual cortex. The "learning machine" capabilities of AI have already been thoroughly proven in various cutting-edge scientific research fields. SenseTime uses originally developed AI technology (hybrid graph convolutional network model, DeepCDR) to accelerate the development and marketing process, shorten the development cycle, reduce overall development costs of new drugs, and accurately predict the clinical outcomes of cancer drugs.

Finally, ensuring legal compliance of AI and proactively protecting data security are key success factors for realizing trusted AI .

SenseTime's technology for AI products are controllable and adopt multiple governance mechanisms for Protect against unethical development and use of AI.

First, the firm uses laws to drive product upgrades, ensuring compliance with the "Personal Information Protection Law" through anonymization and removing personally identifiable information, and ensure that processing of sensitive personal information is authorized and being handled cautiously with minimal storage. It also guarantees the availability of private data in all AI products and supports the right to be forgotten.

Second, AI uses risk management to optimize product design, collect global negative cases, supplement risk control due diligence principles, conduct regular risk assessments, and improve on all products, such as applying the "privacy default design" mechanism in data collection and adopting irreversible data encryption technology to achieve robust data security.

Third, to achieve a diversified AI governance model, SenseTime invites stakeholders from the industry and academia to conduct research and participate in seminars and review meetings, and provide a full vantage point for implementing agile governance ideas and solutions for achieving positive results for all humans and unbiased cross-domain evaluation in social application scenarios.

AI has gradually become an innovative infrastructure for enabling scientific research in multiple disciplines. Industries should only adopt prudent and responsible AI to gain widespread human trust and acceptance across the society.

Part 2

Sustainability Practice



The United Nations Sustainable Development Goals (SDGs) aim to solve development problems in the three dimensions of society, economy and environment by 2030 and embark on a path of sustainable development. The SDGs call on "all countries (regardless of their incomes) to act to promote economic prosperity while protecting the planet," stressing the importance of long-term commitment to poverty eradication, achieving health and human well-being, providing quality education and promoting gender and social equality. It is also imperative to provide universal access to clean drinking water and sanitation facilities, as well as affordable clean energy, innovations and infrastructures. With the rapid development of AI technology, people are now increasingly aware that AI can also be practically applied in these fields.

The United Nations's "Roadmap for Digital Cooperation" report pointed out that AI should be deployed in the optimal way to support the progress of SDGs and benefit the public. The concept of AI for sustainable development originated from the idea that AI can be a principle enabler to supporting the United Nations' 17 SDG goals for changing the world. Under this vision, SenseTime actively promotes the sustainable development framework, and takes practical actions to promote the implementation of the principles of AI for sustainable development in different sub-industries, fulfilling its social responsibility and mission as a global leader in the AI industry.

Next, we closely examine the application of SenseTime's AI solutions in three major industries, including energy grids, healthcare, and education to discuss how AI can empower the digital transformation of industries, thereby promoting a virtuous circle of economic growth.

2.1 SenseTime Practice: Smart grid and "smart +" leading a green energy revolution

2.2 SenseTime Practice: Smart medical care will benefit the world

2.3 SenseTime Practice: Promoting Basic Education of Artificial Intelligence

2.1 SenseTime's practice: smart grid "smart +" leads a green energy revolution



The power industry is the world's most important source of CO2 emissions (45% of CO2 comes from electricity production). Therefore, achieving emission reduction and clean production for generating power, reducing power transmission losses, and fully optimizing the entire process of power production, transmission and consumption will help promote the development of low-carbon power and even advance a low-carbon economy. In this process, smart grids will play an important role in promoting clean power production, promoting efficient use of power, and ensuring reliable power supply. This has become an inevitable trend in the development of the world's power grids.

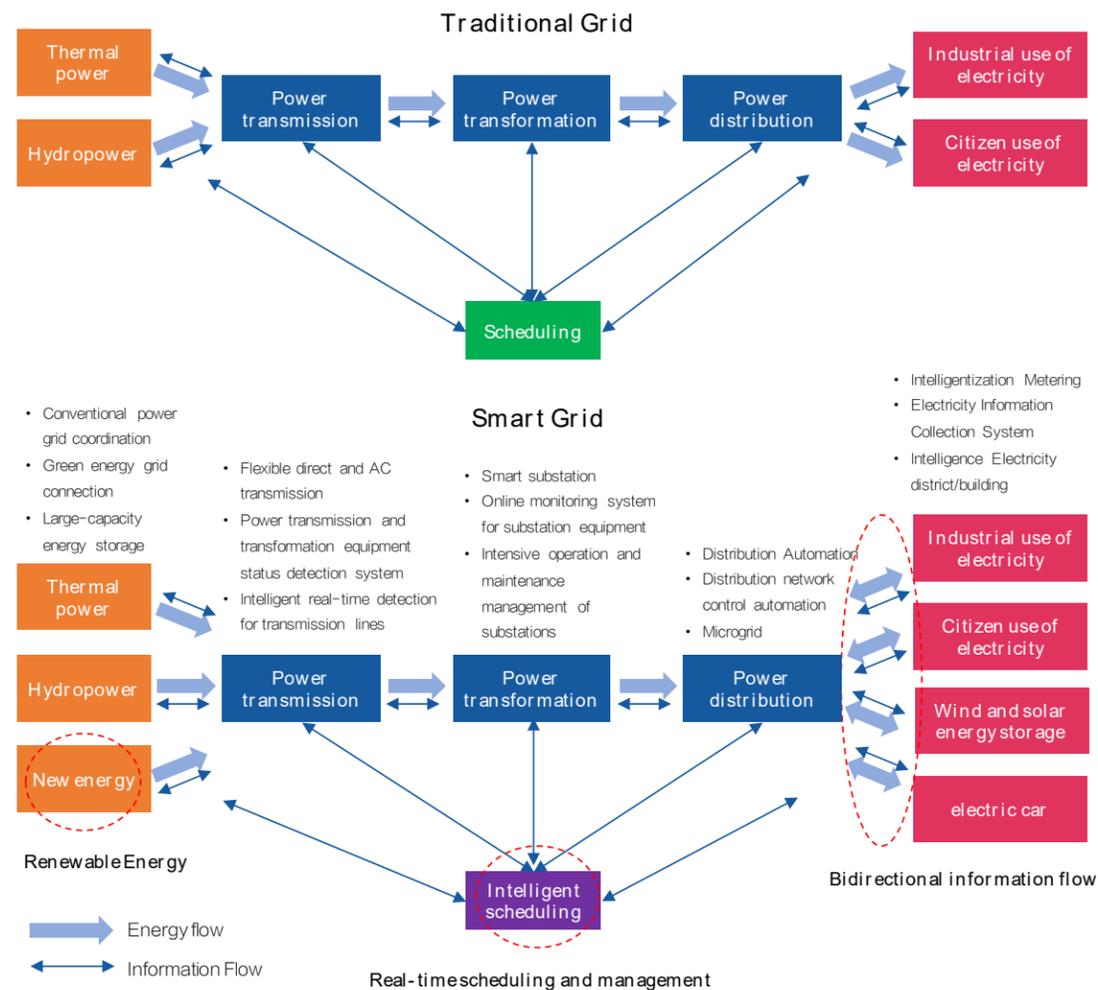
Smart grid AR inspection to enable the stable operation of the grid

The goal of this round of energy reform is to realize a low-carbon economy centered through technological innovation. At present, the energy industry is the world's biggest source of CO2 emissions (45% of CO2 emissions come from electricity production). Achieving carbon emission reduction and clean production, reducing power transmission losses, and fully optimizing the entire process of energy production, transmission, and consumption will help accelerate the development towards a low-carbon economy. In this process, smart grids will play an important role in promoting clean energy production and the efficient use of energy, as well as ensuring reliable energy supply. This has become a significant trend in the development of the world's power grids.

The supply of global resources is tight and environmental degradation is intensifying. After China solemnly proposed to achieve the goal of carbon neutrality by 2060, renewable energies (mainly wind and solar) will become the key trend for the future in China going forward. From the perspective of the power sourcing, new energy sources such as wind and solar possess the characteristics of randomness, intermittence, and volatility. After implementing large-scale grid connection, the use of new energy sources will pose a great challenge because of these unique characteristics.

To ensure safe and stable operation of the power transmission system, the operation and maintenance of the converter station is particularly important. SenseTime uses AI+AR technology to assist human smart grid inspections, thereby improving power operation and maintenance efficiency, saving time and labor costs, and effectively ensuring the safety of grid operations after large-scale grid connections with new energy sources.

In 2020, SenseTime reached an agreement with China Southern Power Grid to conduct the first industrial-level visual testing of AR technology through a pilot study at its converter station. During early stage testing, SenseTime used a large amount of onsite data to complete the data collection process and generate a virtual environment map of the power station. After linking the equipment's operational data and superimposing the external environment data from the later stage, the operators can accurately locate the specific stations needing physical inspection by identifying the onsite environment and helping them determine the optimal inspection patterns. The AI-enabled inspection route allows inspectors to avoid entering the dangerous areas of the power station by mistake, which not only saves inspection time, but also guarantees the safety of inspectors. During the inspection process,



inspectors can automatically record the operation status and inspection-related content with the help of smart equipments, such as AR glasses, tablets and computers etc., while using an AI background system to automatically analyze and complete the inspection report in one click. This reduces the workload of inspection personnel and allows them to realize intelligent assistance and control of the station operations, and support maintenance of converter station equipment. In addition, the AR platform "reproduces" the equipment and environment of the frontline personnel's work area by scanning all environmental data to the computer, so that the technician or power grid expert can trace problems through the computer and manipulate the recorded three-dimensional objects for identification, as well as providing maintenance instructions to the frontline inspector. The AR glasses, on the other hand, allows inspectors to quickly solve the problem of onsite operation in collaboration with another without spatial constraints and make technical communications smoother and more convenient.

2.2 SenseTime's practice: Smart medical care will benefit the world

In the medical field, SenseCare's AI-assisted diagnosis and treatment system enhances the efficiency of medical workers while helping to curb the spread of the new crown epidemic, and has contributed to the realization of the SDGs of the United Nations on health and well-being.



SDG3

Good health and well-being

The United Nations Sustainable Development "Goals and Specific Analysis" pointed out that companies can provide innovative solutions to allow more remote populations to obtain higher-quality health services to achieve SDG3: good health and well-being. Currently, the uneven distribution of medical resources is a major problem facing the medical field. SenseTime uses AI to empower medical care, and uses the SenseCare smart diagnosis and treatment platform to reduce doctors' mechanical diagnosis and treatment work and reduce the rate of missed and false detections. In addition, it also reduces the cost of patients' consultation through the smart hospital operation platform to help achieve sustainable development goals.

May 19, 2019

SenseTime launches SenseCare smart diagnosis and treatment platform

The SenseCare intelligent diagnosis and treatment platform of SenseTime possesses high concurrent 3D rendering capabilities. A single device can support more than 160 doctors to conduct high-quality 3D renderings at the same time, and provide them convenient and real-time interactive analysis. Doctors from various departments can perform full-stack operation of diagnosis, treatment and treatment more conveniently. With the help of SenseCare's original deep learning platform, doctors can flexibly expand clinical applications with rich AI algorithm modules according to the needs and workflows of different departments to provide intelligent support for diagnosis and treatment in different areas of medicine. At the 2019 SenseTime Artificial Intelligence Summit, experts from Shanghai Ninth People's Hospital used bone tumors as an example and introduced this case with the help of SenseCare smart diagnosis and treatment platform, which has greatly improved the efficiency, precision and effectiveness of bone tumor 3D printing treatment planning.

October 2019

SenseTime and multiple parties jointly held two MICCAI International Challenges for Pathology and Radiotherapy

MICCAI 2019, the top international medical imaging academic conference, was held in Shenzhen, China as scheduled. SenseTime published a total of seven papers selected for the main conference. Meanwhile, as one of the major events of the conference, MICCAI 2019 had a digestive tract pathological image detection and segmentation and radiotherapy planning with automatic structure outlined two international challenges organized by SenseTime and multiple parties. SenseTime also undergone the fierce competition, and opened a large number of high-quality labeled desensitization data and knowledge supported by experts in the research field, including a large number of expert-labeled CT data for radiotherapy planning and the industry's first public digestive system pathology image data set.

2019

SenseCare smart diagnosis and treatment platform was highly acclaimed at RSNA (Radiology Society of North America) Conference

During the RSNA 2019 conference, SenseTime competed with the veteran “GPS” (General Electric, Philips, Siemens) from the medical industry on the same stage, demonstrating the strength of Chinese AI companies. Professors and imaging experts from various top American universities, including Stanford University, Johns Hopkins University, University of Pennsylvania, and Chinese hospital experts such as Shanghai Ninth People's Hospital and Peking University Third Hospital, as well as representatives from leading companies like Samsung, General Electric, Siemens, Hitachi, Shimadzu and other companies visited the SenseTime booth for in-depth exchanges. Professor Dimitris Metaxas, a top international expert in the field of computer vision and medical imaging, along with his radiology partners praised the SenseCare smart diagnosis and treatment platform: “SenseCare provides a very effective tool for the imaging department, and builds a bridge of communication between doctors from the imaging and clinical department, so that the value of imaging could be fully extended.”

July 20, 2020

SenseTime SenseCare published the "Federated Learning" paper selected for ECCV, the top computer vision conference

Due to privacy concerns, countries around the world have formulated relevant protective policies for personal medical data, making it more difficult to consolidate multi-center data together for training, though this is a necessary step for the iterative development of medical AI models. Federated learning is a distributed machine learning method that can jointly model multi-center data without sharing data, and technically realize research collaboration while ensuring security. Relying on practical academic research and development as well as keen insights into industry trends, SenseTime joined hands with the Computational Biomedical Imaging and Modeling Research Center of the Department of Computer Science of Rutgers University in the United States to participate in the world's top computer vision conference, the European Conference on Computer Vision (ECCV). New research results were published at the conference, which innovatively used a distributed generative confrontation network (GAN)-based structure to achieve federated learning and open up a "new path" for the last mile of AI medical applications.

2.3 SenseTime Practice: Promoting Basic Education of Artificial Intelligence

In the field of education, SenseTime has effectively reduced the AI digital gap through the development and deployment of a wide range of education platform products and teacher training projects, and has produced a large number of innovative talents for China's AI industry, allowing more children to enjoy equal opportunities for AI education.



Introduction:

Adhering to the belief in popularizing scientific knowledge related to artificial intelligence, promoting the spirit of science, disseminating scientific ideas, and advocating scientific methods, SenseTime has established a set of AI education materials that enables learning from elementary school level to the undergraduate level, and takes into account "basics, expanded learning, and scientific innovation". The teaching system includes 11 volumes of AI textbooks that have been published successively, combined with experimental courses, responsive teaching aids and other supporting AI experimental resources to build an artificial intelligence education module that combines theory and practice. At the same time, through teacher guidance, science and technology competitions, and other learning experiences, the module helps schools train their own AI teachers from being novices to competent instructors able to stimulate students' interest in AI and help the country cultivate and select future-oriented innovative AI talents.

So far, SenseTime has promoted AI basic education in more than 30 cities across the country, more than 2,700 primary and secondary schools, and trained more than 7,200 frontline AI teachers. In the future, SenseTime will continue to deepen cooperation with more cities and universities so that AI basic education will continue to be widely disseminated, and more youths will enjoy more equal opportunities for AI education.



China's first prefecture-level AI high school education base implemented in Jinzhong, Shanxi

On August 13, 2018, China's first prefecture-level AI high school education base was successfully established in Jinzhong, Shanxi. Director Chen Yunlong of the Curriculum Center at the Ministry of Education witnessed the signing ceremony. He fully affirmed the importance of AI and suggested that the completion of this AI education base can be used as a demonstrative and pioneering model for the introduction of AI as a subject for high school education and creating a new model of balanced AI education. Zhang Hairong, Secretary of the Party Leadership Group and Director of the Jinzhong Education Bureau, delivered a speech which highlighted that the strategic cooperation between the Education Bureau and SenseTime will enable AI courses in 35 high schools in the city and create the country's first municipal-level AI teaching base. Jinzhong was tipped to become the "experimental zone" for the establishment of AI elective courses, product development and application, and smart education construction for primary and secondary schools. Empowered by SenseTime Jinzhong would be on the course to develop into an influential and effective city-level AI teaching and talent cultivation high ground for the entire country. Through the demonstration and guidance of the "Jinzhong Model", SenseTime uses the "Artificial Intelligence Fundamentals (High School Edition)" textbook as the basis of training for teachers. The unified deployment and implementation of curriculum content, as well as the practical projects will form a comprehensive course load and will help promote the development of high-quality AI talents in Jinzhong and China.

Related SDGs: SDG1-No Poverty; SDG10-Reduce Inequality

SenseTime released "AI Education Whitepaper: Educational Reform and Innovation Practice in the Intelligent Era"

To address the numerous challenges that AI education has been facing, SenseTime officially released the "AI Education Whitepaper: Educational Reform and Innovation Practice in the Intelligent Era" ("The Whitepaper") on December 16, 2020. The Whitepaper responded to the new propositions for AI education in the intelligent era, starting with the case of SenseTime Education being implemented in Qingdao, Shandong, and Shanxi's Jinzhong city. It analyzes the core differences between Traditional IT education and AI education while also discussing the idea of "Inclusive and balanced AI education", which called for the establishment of an open and shared AI education system.

Related SDGs: SDG1-Eliminate poverty; SDG10-Reduce inequality

The world's first SenseTime Artificial Intelligence Education Research Institute constructed in Qingdao

On March 29, 2019, SenseTime's first artificial intelligence education research institute was officially completed in Qingdao. The Qingdao Education Bureau and the Laoshan District Government respectively signed a "Memorandum of Cooperation" with SenseTime confirming a mutual commitment to carry out comprehensive cooperation in the field of "artificial intelligence + education". Starting from September 2019, the city will fully implement artificial intelligence education among at least 20,000 students in 100 artificial intelligence pilot primary and secondary schools. In 2019, a total of 10 teacher training sessions were carried out with 468 participating teachers; in August 2020, a total of 3 online teacher training sessions were carried out with 451 participating teachers. Through training, 67 outstanding teachers have emerged in Qingdao, who will actively play a leading role in inspiring and leading the construction of AI courses.

Primary and secondary schools in Xuhui District, Shanghai began to pilot the implementation of basic AI courses

In October 2019, 8 high schools, 12 junior high schools, and 10 elementary schools in Xuhui District, Shanghai began to pilot the basic courses of "Human and Industrial Intelligence". In 2020, the district started the implementation of basic AI courses. Based on the national version of the "Information Technology Curriculum Standards" for ordinary high schools, SenseTime and the Xuhui District Education Bureau together designed and compiled the "Opinions on Implementing the Artificial Intelligence Curriculum in Primary and Secondary Schools in Xuhui District" and the "Basic Requirements for an Artificial Intelligence Curriculum Teaching in Xuhui District's Primary and Secondary Schools". In April 2019, Xuhui District held the first AI course training for teachers in the district.

Donation for poverty alleviation through education in Zhanggong District, Ganzhou, Jiangxi

On September 7, 2020, SenseTime donated infrastructure and service resources to support the development of AI education in the entire district to the Zhanggong District Government, aiming to promote the implementation and popularization of basic AI education in Zhanggong and cultivate AI literacy of local teachers and students to accelerate the inclusive and balanced development of AI basic education. Through this project, SenseTime effectively helped the Zhanggong District to further improve its educational capacity, assisted in poverty alleviation, and stimulated new economic growth in this region.

Related SDGs: SDG1-Eliminate Poverty

SenseTime participated in the International Youth Artificial Intelligence Exchange Exhibition (IAIE) for three consecutive years

For the sake of allowing students to apply AI knowledge and the AI innovation spirit learned from school, SenseTime Education has participated in the IAIE for three consecutive years, starting from 2019. The accumulated number of students participated in the competitions reached more than 4,000, including students from 14 countries and regions around the world, and 21 provinces across China.

The Shanghai Jiaotong University's Affiliated High School and SenseTime cooperate to build an artificial intelligence laboratory

As one of the top 100 universities in the country and one of the four most prestigious Shanghai high schools, the Shanghai Jiaotong University's Affiliated High School epitomizes the characteristics of technological innovation and has created a "top-notch innovative talent training base" in order to cultivate students' basic skills and awareness of artificial intelligence, technological innovation processes and skills. "In 2020, we will cooperate with SenseTime to build an artificial intelligence laboratory, develop the contents of science and technology innovation courses and design a complete teaching plan. At the end of the same year, at the 3rd Shanghai Youth Artificial Intelligence Challenge, 12 of the high school's students participated in two competitions (AI Research Achievement and AI Challenge) and won 12 awards (a total of 25 people won prizes in Shanghai), including three first prizes, four second prizes, and five third prizes.

Shanghai Luwan Senior High School was officially listed as Shangtang Technology Experimental School

As an experimental and demonstrative high school in Shanghai, Shanghai Luwan Senior High School features science education and promotes the development of AI education as well as the transformation of learning methods in the information age. In 2019, it was officially listed as "Shangtang Technology Experimental School" to transform into an AI benchmark school. AI scholarships and teaching awards were established to reward teachers and students with outstanding performances in AI education and learning. The school has built an AI teaching platform to popularize and promote AI courses. It has also established a science and technology innovation platform to cultivate AI and science and technology talents. Under the guidance of science and technology innovation from the scientific system, students from the school won the title of the 18th "Science and Technology Stars of Tomorrow".



Part 3

Human-Centric Practice

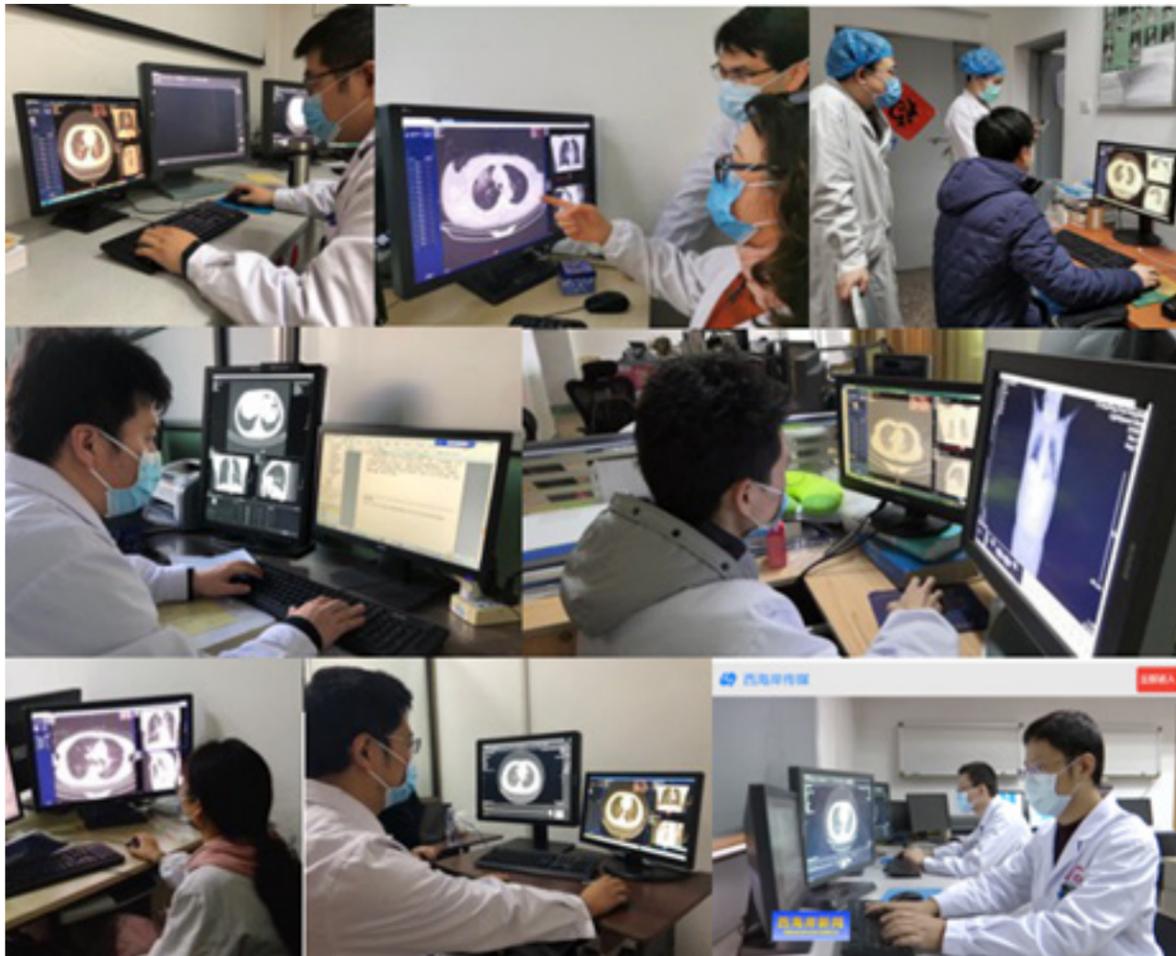
- 3.1 SenseTime Practice: SenseCare Platform of SenseTime Smart Medical empowering frontline medical workers
- 3.2 SenseTime Practice: Empowering smart cultural tourism and welcoming the arrival of the metaverse world
- 3.3 SenseTime Practice: a smart passenger service platform, empowering Chengdu's urban subway transportation system



The idea of sustainable development is centered on the idea that social development is essentially the realization process of people's diverse and multidirectional value requirements and the process of realizing people's own values. It requires that in the process of social development. All the attributes of society must be cultivated so that everyone can find meaning and value in their lives. Sustainable development education strives to cultivate everyone into an independent, harmonious, and comprehensively developed individuals whose material and spiritual needs converge toward a set of common goal. This is the ultimate value goal of sustainable development thinking. So the process of artificial intelligence development in China requires developers and policymakers to pay attention to the "Human-Centric Approach" value system.

Under the guidance of the "Human-Centric" value system, SenseTime actively promotes the Implementation of AI as aligned with the UN SDGs, which commits to the practice of human-centric values in the application of AI Technology.

3.1 SenseTime Practice: SenseCare Platform of SenseTime Smart Medical for empowering frontline medical workers



SenseTime AI medical imaging team rushed to assist hospitals throughout the country during the epidemic

During the COVID-19 epidemic, CT images of the lungs were an important reference in the clinical diagnosis of the COVID-19 virus. SenseTime, in collaboration with hospitals in Hubei Province, quickly developed a COVID-19 upgrade for public health monitoring systems based on the SenseCare chest CT intelligent clinical solution. The product relied on ground-breaking deep learning algorithms to assist radiologists in quickly completing the screening of lung CT images, automatically prompting areas of suspected new coronary pneumonia lesions in the images, and completing quantitative analysis within 2 to 3 seconds to help frontline workers. This vital support would help decide whether to undertake nucleic acid testing, quarantine, or other measures to implement early detection, quarantine, and treatment to buy precious time for patients, and minimize further infection.

Hubei Province was at the frontline in the fight against the epidemic and in order to treat and process as many patients as possible, the province had to quickly and accurately classify "suspected positive cases. This raised the critical challenge of false positives where instances of imaging scans of pneumonia" were clinically diagnosed inaccurately as positive COVID-19 cases. This chronic problem would lead to increased caseloads of COVID-19, which also led to a substantial increase in the workload for hospitals and imaging doctors during this critical period of time.

To quickly relieve the pressure of frontline doctors, the SenseCare Chest CT intelligent clinical solution was connected to the partner institutions' medical image reading platform via a cloud service, and it quickly supported more than ten frontline hospitals through remote means. Many medical institutions provided their doctors with free AI-assisted analysis.

During the epidemic, Qingdao West Coast New District People's Hospital was the designated unit for treating COVID-19 in the city of Qingdao and had to shoulder the important of screening of patients. SenseTime's smart medical team urgently coordinated server resources during the the most critical early stages of the epidemic in February 2020 and enabled frontline workers to overcome a variety of challenges such as heavy snow conditions and poor logistical systems, the teams rushed to the hospitals overnight to install the AI solutions and train doctors to be ready to use the new technology on the very next day ready.

During the resumption of normal work, the Qingdao West Coast New District People's Hospital received a batch of 120 resumption CT medical examination tasks. With the assistance of AI, the doctors sent out all the required diagnosis reports within just 20 minutes, which greatly improved their efficiency for the resumption screening and avoided long, unnecessary stays in the hospital, and reduced the overall risk of cross-infection.

3.2 SenseTime Practice: Empowering smart cultural tourism and welcoming the arrival of the metaverse world

The global tourism industry has been severely impacted during the epidemic. Based on past data and long-term development projections, tourism in China is now firmly established as the main leisure activity of Chinese residents.

According to statistics from the Ministry of Culture and Tourism, the number of domestic tourists increased from 3.262 billion to 6.006 billion from 2013 to 2019, nearly doubling, with an average annual growth rate of more than 10%. During this time China had entered the era of mass tourism.

While consumer adoption of technology and applications have provided convenient means for booking travel, lodging, and local attractions, the supply side of the travel and leisure sector had yet reach the necessary maturity. The result is that management of major attractions, and the lack of innovation and uniformity of industry-wide content resulted in severe disconnection from the reality of exploding consumer demand.

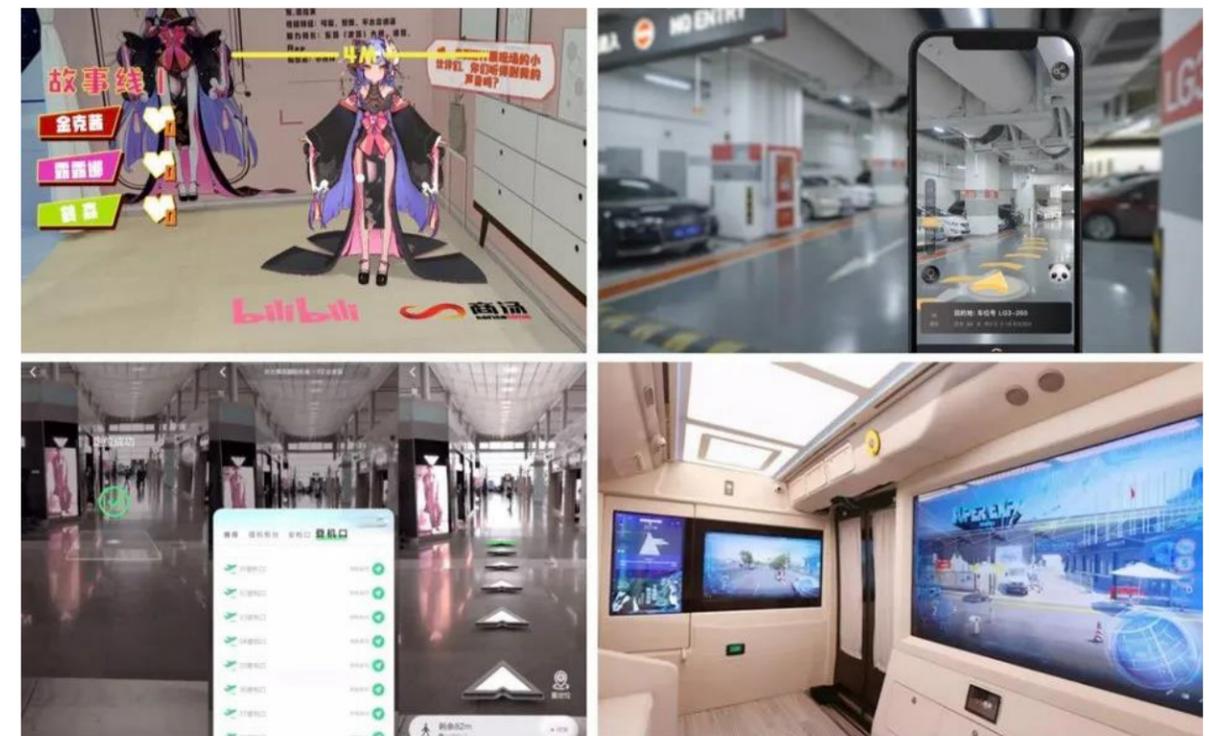
With the maturity and widespread application of 5G, Internet of Things, cloud computing, artificial intelligence, big data, AR/VR, high-definition video and other technologies, a new generation of information technology has become the new engine to power culture and tourism integration and transformation. Tourism is the vehicle and technology is the driving force to promote transformation of the tourism industry towards the ideal of "smart cultural tourism".

Focusing on the goal of "strong management, excellent service, emphasizing experience, and more innovation", the construction and development of smart cultural tourism is reflected across three aspects.

First is the need for cultural and tourism enterprises to enhance the intelligence of their services and products. This would include new developments such as: AR tour guides, smart scenery, smart amusements, smart entertainment, smart cultural expo, virtual tourism and big data using precision marketing among others.

The second is government and tourist attractions to strengthen and refine the management of scenic spots, cultural sites and enhance the intelligence and automation of public services. Tools and technologies such as information supervision, big data statistical analysis, visitor flow management, early warning safety systems, and others must be explored. Together these tools provide a comprehensive understanding of industry and consumer needs, as well as the state of the consumer user experience. This vital insight could be used to promote the transformation of traditional tourism management methods to fit the modern age.

The third is to better serve consumers by enhancing the "intelligence" of innovative cultural travel experiences and consumer services. Using AI technology will promote the efficient harnessing of cultural tourism resources with diversified and personalized consumer needs. This would realize real-time, interactive, and personalized services such as precise and seamless online and offline services and in-depth cultural experiences to enhance the overall user experience.



In 2016, SenseTime launched the SenseME Mercury smart mobile terminal platform and the SenseMARS Mar mixed reality platform. These were built on the accumulation of original AI technologies such as intelligent perception, intelligent content generation and intelligent content enhancement, becoming the two of the largest metaverse empowerment platforms today. Relying on the SenseCore

SenseTime AI device and SenseME software platform, powered by over 3,500 AI models, enables a broad range of IoT devices to facilitate perception intelligence and content enhancement. Our SenseMARS software platform, powered by over 3,500 AI models, supports the development of Metaverse to create exciting new life experiences. Perceptual computing and other key capabilities that drive the metaverse can efficiently construct a digital twin simulation of any real world environment and scenario to help connect between the real world and the virtual world.

At the Chengdu IFS International Financial Center, SenseTime has fully realized a high-precision indoor AR navigation environment and enhanced customer shopping patterns through a series of brand marketing activities that are integrated in the navigation process. Furthermore, the firm created a new traffic portal and closed marketing loop within the metaverse as the offline retail format. Aiming to enter the public park scene, SenseTime has worked to digitize entire outdoor spaces through the metaverse, and fully improve the operation and management efficiency of all people, objects, and events within the park.

In July 2021, SenseTime also cooperated with Bilibili to jointly create a virtual pavilion experience for its real-world carnival event BilibiliWorld. Two-dimensional virtual anchors appeared the pop-up videos on weekdays and were featured in vivid 3-D. The image emerges before the player's eyes and starts a virtual and real-world interaction with the player across the dimension wall, creating a new mode of interactive entertainment within the metaverse.

SenseTime also gives full play to its cross-industry advantages, integrates AR and intelligent driving technology to innovatively construct the SenseAuto AR-Robobus. Riders can see the city, people, and other landscapes through the VR headset and gain a novel experience for visiting the park and scenic spots using metaverse.

3.3 SenseTime Practice: a smart passenger service platform, empowering Chengdu's urban subway transportation system



In March 2020, the Standing Committee of the Political Bureau of the CPC Central Committee held a meeting to study and decide how best to promote the construction of China's "new infrastructure", which includes urban rail transit and AI as a critical foundation technology for the new infrastructure. In April 2020, the National Development and Reform Commission further clarified the connotation of the concept of "new infrastructure" and divided the concept of new infrastructure into three aspects: innovative infrastructure, information infrastructure and integrated infrastructure. The subway in many parts of China has become an indispensable mode of urban transportation. As the scale of the subway systems has increased, so the needs of passenger safety, operational efficiency, service quality and other aspects of the system will become unsustainable. Hence there is an urgent need to build a smart subway intelligence or "brain" to realize the notion of intelligent management.

The "Smart Passenger Service Platform " was jointly created by SenseTime and Gioneco and covers multiple systems such as smart ticketing, and smart security. Relying on multiple original and leading AI technologies of SenseFoundry Traffic, the platform has successfully enabled ticket validation in the Chengdu subway. The net effect has been to reduce costs and increase efficiency. Mr. Pu Lei, head of the implementation of the smart passenger service platform project at Gioneco, said, "Relying on SenseTime's core technical advantages in the field of general vision and distributed architecture and other software and hardware collaboration capabilities, the platform has brought breakthroughs and innovations in passenger experience. In the future, Gioneco will continue to deepen cooperation with SenseTime, and use its AI technology to accelerate the construction of smart rail transit systems.

Chengdu Metro's deployment of centralized servers has greatly reduced operation and maintenance costs, but it also brought significant challenges for the supporting algorithms and flow of network transmissions. In this regard, the SenseFoundry Traffic smart transportation platform has innovatively leveraged AI and a ultra-high-precision original algorithm with a payment validation that has only a one-millionth error rate that passes through the core database to the frequent customer database of each site and the central server. The parallel search and comparison method has achieved a significant increase in response speed, and significantly simplified the complexity of the network deployment. In practical applications, the entire process from information acquisition, identification, comparison, and validating ticketing takes less than 200 milliseconds, and there is no discernable delay when passengers pass through the gate.

The ticket gate also uses a customized SensePass Pro all-in-one machine, which can accurately complete the comparison and live detection processes under complex lighting and multi-person traffic scenarios. At the same time, passengers do not need to remove masks when entering the station using the "Sensitive Passing" technology which can automatically detect the mask-wearing status of travelers to ensure public safety o prevention and control stage. At present, citizens and passengers can already choose to activate this function through the Chengdu MetroApp, and they can enjoy the "touchless traffic" during the entirety of their trip. In the future, with the support of the SenseCore SenseTime AI device, SenseTime will also automatically and efficiently mass-produce various high-quality algorithms in response to problems in station management and in the effort to provide a safe and efficient ride experience for passengers.

Part 4

Controllable Technology Practice

4.1 SenseTime Practice: Data Privacy Protection

4.2 SenseTime Practice: Algorithm and Semiconductor Evaluation

4.3 SenseTime Case: Research on Scientific Research Projects

With the continuous expansion of the breadth and depth of artificial intelligence technology, AI has become a critical component of the modern information infrastructure. However, risks are constantly emerging in this process of growing adoption, Risks such as privacy leakage caused by data abuse, the risk of algorithm security, growing application risks and complex system decision-making make it difficult to clearly define all the responsible parties. With these growing risks, it has become a global imperative to promote the development of credible and controllable artificial intelligence technology.

We believe that "Controllable Technology" AI refers not only to compliance and control at the application level (such as data privacy protection), but also to the independent control of core technologies. to follow up with independent control and form the core through theoretical innovation and technological breakthroughs. Competitiveness is the key. This part discusses cases of data privacy protection, technological controllability of artificial intelligence training and development platforms, and innovative technology research topics to achieve technological controllability, and introduces how SenseTime's practice in related fields reflects the principle of Controllable Technology.

4.1 SenseTime Practice: Data Privacy Protection

SenseTime is the first artificial intelligence company to obtain all three ISO /IEC privacy information management systems, information security management and personal identity information protection certifications. SenseTime attaches great importance to data security and protection. We have adopted standard protection measures, including confidential frequency division, access control, data encryption and desensitization, to prevent unauthorized access, disclosure, improper use or modification, damage or loss of data and personal information. The Data Security and Personal Information Protection Management Committee supervises the whole discipline of data security and personal information protection. We have established a comprehensive personal information management system and formulated a series of technical standards and specifications to ensure the safety of data and personal information throughout the entire product development life cycle.

The following shows the main measures of our data and personal information protection measures:

(1) Authorized access and use of data

In terms of authorized access and use of data, we require customers to confirm that they have obtained the right to use the data from legal sources and that the end user has agreed to the purpose of use specified in the agreement. We only use the data for the purposes expressly authorized by the customer, such as identity verification, record keeping and statistical data, and will not use the data for purposes without prior approval and consent. We continue to monitor data processing cooperation with third parties, and regularly review the content of such cooperation, the scope of cooperation agreements and the implementation of such agreements to ensure compliance with relevant laws and regulations.

(2) Independent database and security server system

We have our own independent database and will not share the personal information of customers or end users with other third parties. Our server system has been protected by an enhanced security level. We regularly implement user account review and monitoring of server operations. Once security problems are found in several server systems, we will immediately upgrade the relevant systems to ensure the security of the server systems and applications. We have strengthened the encryption of sensitive personal information in the system to ensure data confidentiality. We have a comprehensive personal information security and management system, covering the security management of our data, source code, personal information, third-party personnel, network security incidents and infrastructure.

(3) Comprehensive data and personal information security and management policies

We have implemented a comprehensive employee confidentiality policy, data use approval process and data tracking mechanism to ensure the security of our database. We have formulated corresponding work procedures in accordance with relevant rules and regulations. As a data processor, we have implemented a number of data protection and network security measures to ensure that we properly handle sensitive data, including the data desensitization technology we use for all data training activities. Through continuous investment in technological advancement, we improve our overall safety capabilities. At the same time, we have obtained information security management system certification (ISO/IEC 27001:2013), personal identity information protection management system certification (ISO/IEC 29151:2017) and privacy information management system certification (ISO/IEC 27701:2019), etc. The key products have passed the information security registration protection evaluation. According to the needs of overseas business, we have officially launched the certification of the international privacy

standard BS10012 (compared to the EU GDPR Personal Information Protection Act), and it is expected to obtain the certificate in early 2022. In addition, we attach great importance to data security in product design, and products must pass data privacy assessments and security tests before they are launched or delivered to customers.

(4) Privacy processing of the data platform

Data security and privacy protection are regarded as the basic requirements of our training data platform, and we strive to follow the highest standards of information security and data privacy. Specifically, we protect data through systematic access control and data encryption, and protect data privacy through automatic desensitization. We hide personal and sensitive information to ensure that no personal information is attached when the data is used for training. In the DCP technology platform, we have developed a data gateway to ensure the compliance of data entering the cluster. For specific scenarios such as automobiles, we have also formulated group standards such as "Technical Requirements and Methods for Automotive Transmission Video and Image Desensitization" to achieve better data compliance.

(5) Regular review and emergency plan

We conduct special audits on data security compliance status every year. In 2021, a total of on-site interviews were conducted on the entire process of R&D, testing, and delivery of the BI production line, smart city product line, smart driving production line, SenseID production line, and mutual entertainment product line. The special working group conducted investigations on high-risk exhibits, promoted the implementation of the privacy rectification of high-risk exhibits, and formulated a safety review process for exhibition halls. We have developed a cyber security emergency plan, and conduct annual training and security demonstrations to prepare for any emergency cyber security incidents. If security measures are affected, we will report to the competent authority in accordance with relevant laws and regulations, and promptly notify the affected users.

4.2 SenseTime Practice: Algorithm/Chip Evaluation

SenseTime has achieved true credibility and controllability of AI technology through algorithm verification and evaluation based on data sets in real scenarios. Algorithm evaluation not only guarantees the reliability and credibility of AI algorithm applications, but also enables the results of the entire algorithm implementation to be controllable in the entire process of product development. The significance of achieving technologically credible and controllable artificial intelligence through algorithmic evaluation is to transform the principles of artificial intelligence into specific best practices and implement them into technology, products and applications. We believe it is the core responsibility of trusted AI enterprise to respond to social concerns, prevents AI ethical risks, and solves outstanding applications. The important path and inevitable choice to analyse and resolve contradictions are also important tasks related to the long-term development of artificial intelligence technology.

Specifically, on the one hand, algorithm evaluation can help us fully, complete and consistently test the behavior and results of AI algorithms, ensuring that the results of the algorithm are completely predictable and controllable, thereby achieving stability at the result level. On the other hand, through professional evaluation, we can ensure that the algorithm can be completely, fully and correctly defined and used. The defined rules and consequences can be repeatedly verified through the data set to obtain reliable results, and achieve AI credibility and controllability of technology.

Through the method of algorithm evaluation, real data sets can be used to comprehensively evaluate the real application scenarios of the algorithm, focusing on "data privacy protection of AI algorithms", "robustness of AI algorithms", "fairness of AI algorithms", etc. In many aspects, the whole process of AI products and openness is evaluated, including but not limited to data processing, model construction, model deployment, and supporting service-related product processes, through the entire life cycle of the research and development and use of artificial intelligence algorithms. Carrying out the requirement of "controllable technology" and ensuring the credible quality of artificial intelligence algorithms from the source of the product.

In addition, we also pay attention to the evaluation of chips, unite the industry and unite the upstream and downstream of the industrial ecology to form an intelligent computing alliance to better achieve the goal of technological control. The specific measures are as follows:

(1) Comprehensive evaluation of commercialized algorithm scenarios

Through full coverage of the algorithm evaluation of core scenarios and long-tail scenarios, we have achieved credibility and quality via strict controls and governance of all commercialized algorithms. In order to ensure the comprehensive coverage of the algorithm evaluation, we divide the object of the algorithm evaluation into two parts: the main algorithm and the long tail algorithm. The main/core algorithm is the face, the human body and the structured attributes, and the vehicle license plate recognition and the structured attributes, etc., a long-tail algorithm refers to a dedicated algorithm for specific scenarios, involving smart cities, smart rail transit and smart stations. The main algorithm evaluation includes static scene algorithm evaluation and dynamic scene algorithm evaluation, while the long tail algorithm performs comprehensive detailed evaluation according to different dynamic and variable scenarios.

(2) Comprehensive evaluation of algorithms with multiple data sets

In order to ensure that the algorithms can be used completely, correctly and fully, we must fully evaluate the algorithms through sufficient data sets and comprehensive evaluation schemes during the evaluation process. The evaluation of the main algorithm is mainly based on image analysis, and will be calculated according to academic accuracy, recall, accuracy, and F-value: most long-tail algorithms are based on event detection, using videos with events, and some are based on algorithm accuracy testing. There are false negatives and false positives to calculate accuracy indicators, some are based on the time interval dimension of the event occurrence, and some are based on the event dimension of the target object in the video. Take the SenseCore large device as an example, which supports the deployment of 108 types of algorithms, 87 types of different accuracy evaluation schemes, and 1279 test data sets.

(3) Promote the maturity and innovation of algorithm evaluation

As the practice of algorithm evaluation gradually matures, SenseTime will promote the formation of industry algorithm evaluation standards to promote the credibility and controllability of artificial intelligence technology in a general sense. We have refined the methods and practices of the main algorithm evaluation currently used to eventually create a series of industry standards. In the evaluation of the long tail scenario, we have proposed many innovative test methods. For example, using the most advanced frame-by-frame labeling method, we are currently applying for 8 event-based algorithm evaluation patents, while the industry has yet to see any other evaluation methods from this perspective. SenseTime first applied this method in industrial practice to improve Reliability of algorithm evaluation.

(4) Establish a smart computing alliance to promote the implementation of chip evaluation by multiple manufacturers

On July 9, 2021, SenseTime and China Electronics Standardization Institute, East China Branch of China Academy of Information and Communications Technology, Tsinghua University, Shanghai Jiaotong University, Fudan University, And Huawei, Cambrian, Suiyuan Technology and other industry partners to establish the artificial intelligence computing industry ecological alliance (Intelligent Computing Alliance), aiming to continuously explore innovative applications of AI computing, promote the application of domestic AI computing power, and establish an autonomous and controllable AI computing development ecology to promote the sustainable development of China's independent AI computing landscape.

At present, we have basically completed the adaptation of the Cambrian and Haiguang chips, and have begun large-scale procurement and commercialization of AI computing. Currently, Huawei, Tianshu Zhixin, Suiyuan and other self-controllable AI chips are being assessed and validated. In addition, the alliance will actively promote the compilation ecology of autonomous and controllable AI chips, launch the benchmark of long-tail operators, and explore an autonomous and controllable compilation framework based on the guidelines by the Intelligent Computing Alliance.

(5) Establish a joint laboratory to strengthen the systematic process of chip evaluation

The Standardization Research Institute of the Ministry of Industry and Information Technology and SenseTime jointly established the "CESI-SenseTime Artificial Intelligence Computing Power and Chip Evaluation Joint Laboratory" to jointly carry out artificial intelligence chip evaluation methods and related standards research, promote artificial intelligence processor evaluation technology and standardization and other fields, share the experience in the transformation of scientific research in the field of standardization, and further promote the research and formulation of standards for all parties involved in artificial intelligence chips developments.

4.3 SenseTime Case: Research on Scientific Research Projects

In order to ensure the autonomous controllability of AI technology, it is necessary to conduct scientific and technological research with forward-looking technology. SenseTime has started forward-looking research on federal learning since 2019, and has joined hands with the Computational Biomedical Imaging and Modeling Research Center of the Computer Department of Rutgers University in the world's top computer vision conference ECCV (European International Conference on Computer Vision) A new research result was published in the paper, which innovatively uses a distributed generative confrontation network (GAN)-based structure to implement federated learning, which opens up a "new path" to open up the last mile of AI medical applications.

This research uses distributed asynchronous discriminators located in multiple data islands and a central generator to form a confrontation network, so that the central generator can also perform synthetic training without touching the original private data, so that it can generate data with each other. Synthetic data samples similar to the original data in the island are used for downstream tasks. Since direct access to the original data is avoided, this research method inherits the core advantages of federated learning and solves the problem of privacy protection of medical data.

Note that in adopting a new approach in the implementation method to traditional federated learning, the research results also effectively reduced the amount of communication data between the center and the data island. The result is that only synthetic image data and feedback errors are transmitted instead of the entire parameter dataset of the model, which removes the need to exchange any data or parameters between the data islands, which can significantly reduce the cost of research between medical institutions through federal learning, and improve the research efficiency and the production speed of AI models.

In addition, this innovative, low-cost federal learning model can also promote the upgrade of inefficient decentralized data centers to highly-efficient intensive data networks, thereby better assisting the establishment of regional data centers or industry standard databases. This is in line with the national "new infrastructure" strategic guidelines to accelerate the construction of "data intelligence" infrastructure, saving costs and creating value for medical and other industries.

In addition to the above-mentioned research, we also worked with the Shanghai Qingyuan Research Institute to complete the topic of interpretable neural networks for artificial intelligence medical images. At present, these two joint researches have published professional papers which have generated some important academic results detailed below:

(1) One of the ECCV papers selected in 2020, the theme is to innovatively use a distributed generative confrontation network (GAN)-based structure to achieve federated learning, and to train the model on the premise of ensuring data privacy and data security;

(2) One TMI academic paper was selected in 2021, mainly for the topic of interpretable neural networks for artificial intelligence medical images, used to study the interpretability of AI algorithms in the medical field.

Collaboration Partner	Article topic	Selected Publications
Department of Computer Science, Rutgers University, USA	Innovatively use a distributed generative confrontation network (GAN)-based structure to implement federated learning	European Conference on Computer Vision
Qingyuan Research Institute of Shanghai Jiaotong University	Research on Interpretability of Artificial Neural Networks in Medical Image Field	IEEE Transactions on Medical Imaging (TMI)

Part 5

AI Ethics and Governance Practice

5.1 SenseTime Practice: Formation of AI Ethics Council

5.2 SenseTime Practice: Artificial Intelligence Ethics and Governance Risk Control Mechanism

5.3 SenseTime Practice: Establishment of AI Ethical Standards

5.4 SenseTime Practice: External Joint Research on AI Ethics



Guided by the principles of Sustainability, Human-Centric Approach principles, and Controllable Technology principles, SenseTime has implemented AI ethical practices and governance in the following aspects:

5.1 SenseTime Practice: Formation of AI Ethics Council

With the development of the AI industry, AI ethics has become one of the important issues for all parties in the industry, but it is also a huge challenge facing AI-related companies in the development process. AI ethics is not only an important factor for AI companies to assume social responsibility, but also the cornerstone of consumer trust in AI.

As the leader of AI companies, SenseTime also assumes more important industry responsibilities and social role models. The core of SenseTime's ethical work is to promote all employees of SenseTime to participate in the implementation of AI ethics and the construction of a responsible AI enterprise. In the process, SenseTime has been promoted to become the industry benchmark in AI ethics, and SenseTime has been promoted as an advocate of "Sustainable AI" values.

In order to implement the three core ethical principles in specific areas and promote AI ethics to be carried out independently and professionally within the enterprise, it is necessary to establish a professional AI Ethics Council to promote the implementation of corresponding work.

In January 2020, SenseTime's AI Ethics Council was formally established. The AI Ethics Council consists of six members, including two external consultants (academic experts in the field of artificial intelligence ethics) and four senior management member. As the group's first responsible agency in artificial intelligence ethics, the AI Ethics Council is responsible for determining and implementing artificial intelligence ethics related principles, strategies and specific policy measures, designing and promoting the overall organization to implement AI ethics norms within the company, and promoting SenseTime's AI sustainable development strategy, and at the same time leverages SenseTime's influence as an industry leader, and advocates a responsible and sustainable AI development concept in the government, industry, and ecosystem.

Considering that the construction of a healthy AI ethical ecology cannot be achieved by a single act or body, it requires the participation of AI companies, various research institutions, governments and educational institutions, and listens to it. The SenseTime AI Ethics Council is composed of SenseTime's internal high-level and external artificial intelligence authorities. It is composed of experts, and it is mandatory that no less than 1/3 of the external committee seats are required to absorb different backgrounds, different perspectives, and different viewpoints, and take comprehensive considerations to ensure the professionalism, neutrality and objectivity of the committee and its operations.

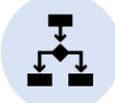
The external members of the SenseTime AI Ethics Council are an important part of the ethics council, which means that they do not hold other positions in the company other than the council members, and there is no relationship with other members of the company and the ethics council that may prevent them from making independent and objective judgments. council members need to make judgments and guidance on SenseTime's ethics and governance-related matters on the premise that there is no conflict of interest. External committee members mainly come from universities, think tanks, and other third-party organizations engaged in AI ethics.

Daily work & responsibilities

 <p>Develop and formulate a strategic development plan in the field of ethics</p>	 <p>Product ethics review and risk control</p>	 <p>Ethics general training and publication</p>
 <p>Ethical governance ecosystem construction</p>	 <p>Participate in the discussion and formulation of ethical standards</p>	 <p>Conduct extensive joint research</p>

Important work content

Express independent opinions on major issues of the firm and the AI Ethics Council (see below for details)

 <p>Decision-making on major issues of the firm's ethics strategy</p>	 <p>The establishment and adjustment of the development plan of the ethics committee</p>	 <p>Nomination, appointment, and dismissal of expert consultants for ethics committee</p>	 <p>Administrative regulations, departmental rules, regulatory documents, and other matters stipulated in the company's articles of association</p>
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5.2 SenseTime Practice: Artificial Intelligence Ethics and Governance Risk Control Mechanism

We have established an artificial intelligence ethical review process to review and monitor the potential ethical risks of our products and services, covering the entire life from project approval, product and service release, to continuous operation monitoring, and subsequent product and solution iterations cycle. Our ethical review process evaluates projects and services based on standards that meet our three artificial intelligence ethical principles. During the evaluation process, we can choose to reject the new product proposal, interrupt the ongoing product development project, or stop the existing products that do not meet our principles and standards. We also attach great importance to data privacy protection, and will conduct a comprehensive review of data privacy-related matters in all our projects and solutions. For our review process of data privacy protection measures, please refer to "Data Privacy and Personal Information Protection". We also hire external consultants to advise on our review procedures and risk management models to ensure that our products and services comply with ethical standards.

Since 2019, in order to closely track illegal events and ethical challenges in the global artificial intelligence industry, SenseTime has established a "global AI ethical risk database", including more than 100 global AI ethical positive and negative events and case studies. This is the core content of the mandatory course training for all SenseTime employees to establish AI ethics awareness, strengthen governance principles and standards, and ensure compliance with our system and processes. Since setting up the AI ethical review process, we have assessed all links from product projects, releases, and the complete operation life cycle, In this review of SenseTime's internal processes from the release date 100% of new product research and development projects undergo this extensive process of review with around, 10% of product project proposals being rejected due to failure to meet ethical guidelines.

We have implemented a strict risk control system in the ethical field and a professional ethical risk control mechanism, focusing on the following three aspects of risk control:



Data risk

Including three aspects, including data privacy, data governance, and data quality

Data privacy

Refers to the problems involving privacy infringement during in the development, testing, and operations of artificial intelligence. This type of problem is currently one of the key construction issues that need to be resolved for artificial intelligence applications.

Data quality

It is mainly used for artificial intelligence training data sets and the potential quality problems and possible consequences of using collected field data. This is a type of data security problem that is unique to artificial intelligence.

Data protection

Mainly refers to the security protection of data held by artificial intelligence development and application enterprises, involving the entire life cycle of data collection, transmission, storage, use, and circulation, as well as various links such as artificial intelligence development and application.



Algorithmic risk
(Including application risk and systemic risk)

Based on the process of using the algorithm, the ethical issues of the algorithm become understood based on three aspects: the autonomy of the algorithm, the application scenario and the difficulty of imputation.

The autonomy of algorithms not only improves the efficiency and quality of decision-making, but also introduces uncertainty and opacity into the decision-making process.

Application risk: The ethical issues of algorithms in application scenarios, including algorithm bias, algorithm discrimination and personal privacy protection, etc.

System risk: the problem of imputation dilemma of algorithm. Algorithms can adjust operating parameters and rules autonomously. This adjustment is likened to "black box operation", which introduces uncertainty into the decision-making process and challenges the controllability of the algorithm.



Social risk

Because artificial intelligence is a completely different technological system from the traditional, artificial intelligence is bound to produce profound changes from the inside out to human society and cause corresponding risks.

Labor competition

Multiple subjects

Blurred borders

Capacity overflow

Punishment is invalid

Ethical conflict

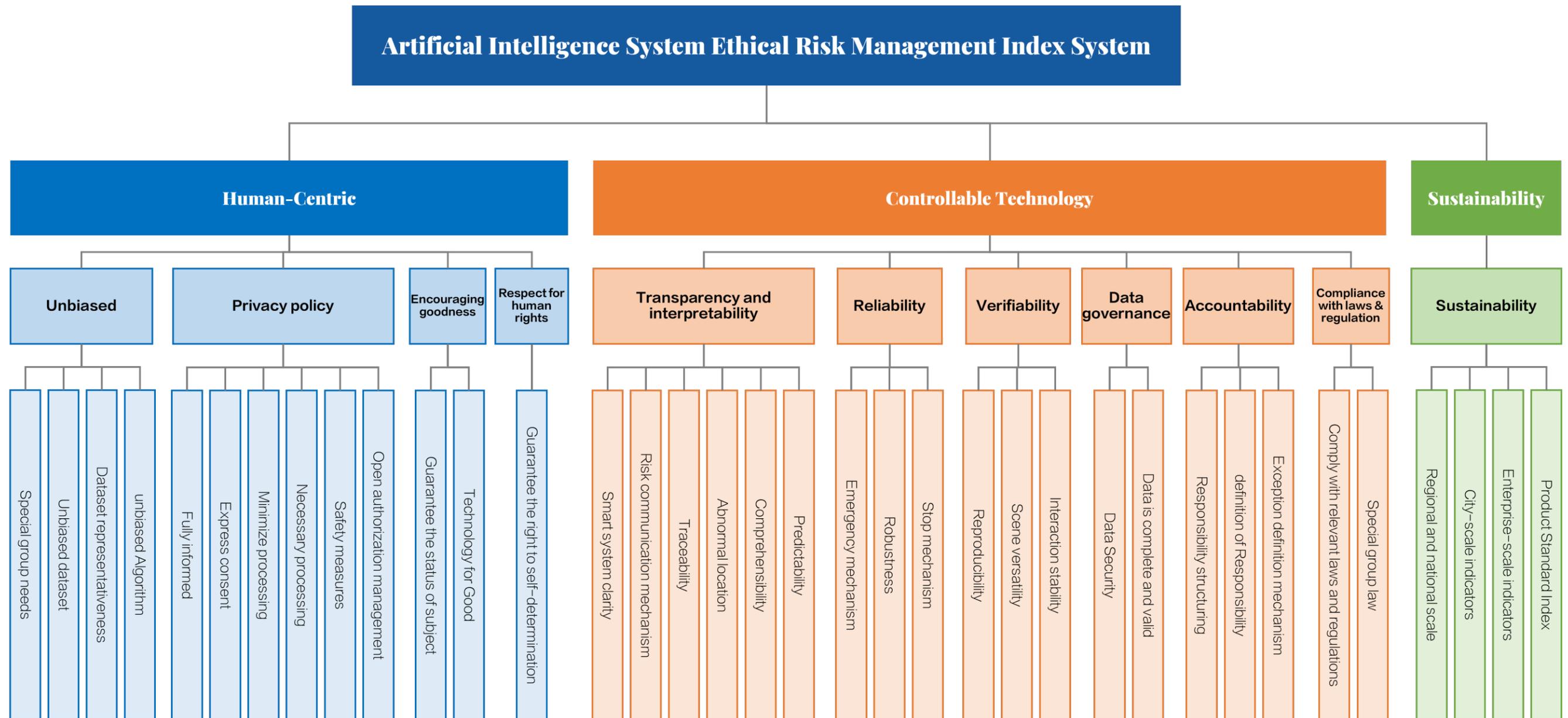
The spread of violence

Population substitution

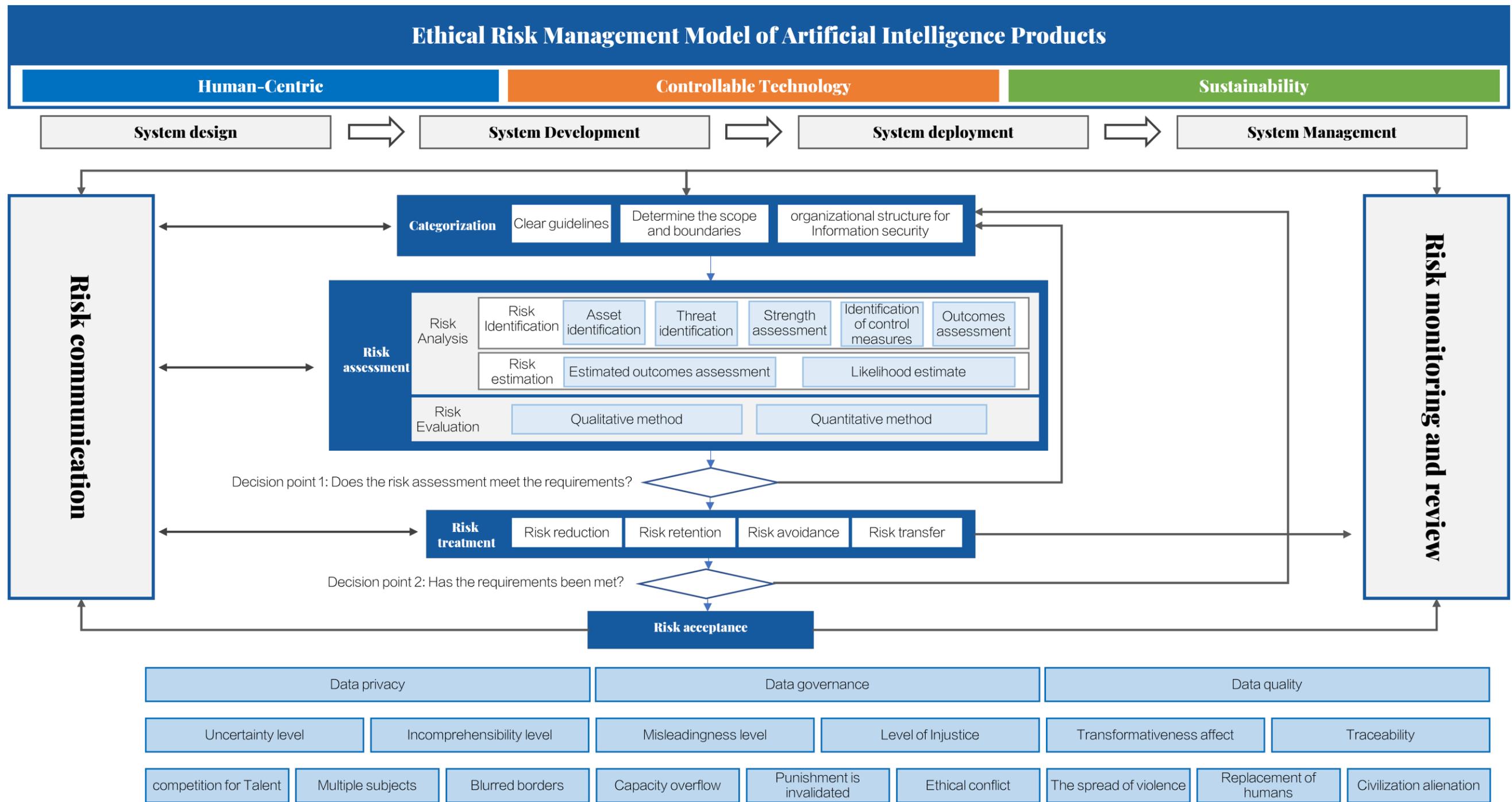
Violating cultural norms

In 2021, SenseTime began to focus on the construction of an online risk control system to enhance the depth of AI ethical audits. By introducing external experts to provide professional guidance on the improvement of the entire review process and risk control model, SenseTime's practice is based on

human-centric and controllable technology. The ethical standards of the sustainable development system, the specific indicators are as follows:



According to the above indicators, we have implemented a comprehensive ethical risk management model for artificial intelligence products as shown in the figure:



5.3 SenseTime Practice: Establishment of AI Ethical Standards

We serve as the Vice Chair of the AI Reliable National Standards Working Group. We led the drafting of 13 national or organizational AI ethical standards initiated by the AI Reliable National Standards Working Group. These standards include Artificial intelligence–Risk assessment model, Artificial Intelligence –Evaluation Guidelines for Ethical Risk and others. We also serve as the Vice Chair–member of the Shanghai Artificial Intelligence Standardization Technical Committee, allowing us to be closely involved in setting industry standards in multiple areas such as responsible AI, AI ethics and data security..

We participated in the following industry standards initiatives: "Artificial Intelligence Risk Assessment Model", " Machine Learning Algorithm Security Evaluation Specification", "Artificial Intelligence Ethics and Governance Specification", "Information Technology Biometric Recognition Face Recognition System Application Requirements", "Face Recognition System Trustworthy More than ten standard projects related to ethics, such as "Requirements", "Guidelines for Safety Standards for Artificial Intelligence Data Collection and Labeling", "Guidelines for Trusted Artificial Intelligence R&D Management", and "Artificial Intelligence Trustworthy White Paper".

In addition to actively participating in the implementation of multiple standards in the field of trusted artificial intelligence (AI ethics and data security), SenseTime has served as the leader of the National Standards Working Group for Face Recognition, the Deputy Leader of the AI Trusted National Standards Group, and Shanghai Deputy chairman of the Municipal Artificial Intelligence Standardization Technical Committee, member of the joint working group, promote the construction of the standard system of artificial intelligence technology and products, formulate specific standard plans, comprehensively carry out the national standard revision work, promote the healthier development of the industry, and contribute to the global standardization cause Shang Tang Wisdom.

<Ethics & safety related meetings>		
No.	Organization	Assume a role
1	Facial recognition National Standards Working Group	Group leader
2	IEEE Face Recognition Working Group	Chairman
3	AI Trustworthy National Standards Working Group	Deputy head
4	ISO/IEC JTC1 WG3 AI can be trusted	China representative expert
5	National Information Security Standards Committee	Committee member
6	"Interconnection Project" of the Institute of Information and Communication Technology	Co–chief editor
7	Smart Social Governance Standards Project of Tsinghua University	Member
8	New Generation Artificial Intelligence Alliance (AITISA) Data Privacy Protection Task Force	Member
9	CCSA/ TC8 Network and Information Security/WG3 Security Management	Member

5.4 SenseTime Practice: External Joint Research on AI Ethics

Our cooperation with third-party organizations and think tanks enables us to keep abreast of the latest developments in the field of artificial intelligence ethics, and to remain neutral and objective when implementing artificial intelligence ethics practices. These collaborations also strengthen our position as an industry leader in the artificial intelligence ecosystem and further enhance our influence in advocating responsible and sustainable artificial intelligence.

In order to promote our human-centric principle in the field of artificial intelligence governance, we assume the role of vice chairman of the Institute of Artificial Intelligence International Governance at Tsinghua University, which is a leading academic institution in the field of artificial intelligence governance in China and is represented by well-known scholars at home and abroad. We cooperate with these scholars to promote research on innovative and sustainable governance models such as agile governance.

We advocate the principle of Controllable Technology in the field of artificial intelligence and compliance, and jointly established the Computing Law and Artificial Intelligence Ethics Research Center with Shanghai Jiaotong University to promote research in the fields of data security, privacy protection, and unbiased algorithms. We also cooperate with other organizations to conduct research on the interpretability of artificial intelligence algorithms.

In order to further promote the global development of our sustainable development principles, we have conducted in-depth cooperation with the United Nations and other international organizations. In the Resource Guide on Artificial Intelligence (AI) Strategies issued by the United Nations in June 2021, the Code of Ethics for Sustainable AI Development (Code of Ethics for Sustainable AI Development) was selected as a private One of the department's main reference publications.

SenseTime's research on artificial intelligence ethics involves many topics, including but not limited to artificial intelligence ethics and law, artificial intelligence governance and sustainable artificial intelligence. We believe that relevant research work has consolidated the foundation of our artificial intelligence ethical principles and combined our industrial practices with artificial intelligence ethical principles. SenseTime actively carries out foreign cooperation research in the field of artificial intelligence and conducts joint research on artificial intelligence-related topics with the Global Artificial Intelligence Academic Alliance, Tsinghua University, and Shanghai Jiao Tong University.

At present, there are 10 research projects in cooperation with university think tanks, including 7 research projects of Shanghai Jiaotong University, 2 research projects of the International Institute of Artificial Intelligence of Tsinghua University, and 1 research project of the Shanghai Institute of Science. The specific topics are as follows (Attached table):

Collaboration Partner	Subject name
Kaiyuan Law School of Shanghai Jiaotong University	Artificial Intelligence Ethics and Judicial Case Studies
	A Comparative Study of AI Ethics and Legislation
Shanghai Jiaotong University Computational Law and Artificial Intelligence Ethics Research Center	Application and Value Group of Big Data Evidence in Criminal Justice
	Research on International Rules of Digital Economy Industry
	Risks and prevention of urban technological governance in the post-epidemic era
	Research on Smart Judicature in the Source Governance of Contradictions and Disputes
Shanghai Institute of Science	Research on the legal attributes and ownership of data
	Social Experiment of Bioinformatics Characteristics of Digital City
International Institute of Artificial Intelligence, Tsinghua University	Digital and Intelligentization Governance Report in the Post-epidemic Era
	Corporate Social Responsibility Report on the Concept Sustainable Development for AI

Conclusion

This report is the second time that SenseTime has issued its "AI Sustainability Report". To advance from last year's report, we have expanded the remit and definition of "sustainable development" and compared SenseTime's development in different directions over the past year. Corporate practices are placed in the new report.

SenseTime's mission is to insist on originality, let AI lead human progress, and allow AI to promote economic, social and human development, and build a better future. This has prompted SenseTime to continue to use artificial intelligence to benefit the public, enhance industry capabilities, and tolerate Open innovation. In this process, we will continue to promote the implementation of AI ethical values and promote the practice of sustainable artificial intelligence. This is an important ideal and benchmark for us to adhere to and commits us to align with the "integration of knowledge and action" and to promote our corporate vision. It is also what we passionately believe must be implemented. "Technology for good" is a critical guiding principle and our North Star. As Xue Lan, professor and dean of Schwarzman College of Tsinghua University, said, "Due to the rapid development of technology and development, AI's ethical governance goals are constantly changing. The ecosystem cooperates to make contributions to the governance efforts of artificial intelligence and strives to guide the development of artificial intelligence in a more benevolent and inclusive direction."

Looking to the future, the long-term sustainable development of artificial intelligence technology will be based on ethical and moral standards, and its ability to continuously benefit human society. As a leading company in the AI field, SenseTime will continue to implement relevant practical work and jointly promote a better and happier future life through extensive cooperation and connection with the industrial ecology.

Steering Committee

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- Ji Weidong** Dean of the Chinese Academy of Law and Society, Shanghai Jiao Tong University
- Yang Fan** Co-founder and Vice President of SenseTime
- Zhang Wang** Vice President of SenseTime
- Lin Jiemin** Vice President of SenseTime
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