



Society 5.0 and Artificial Intelligence with a Human Face

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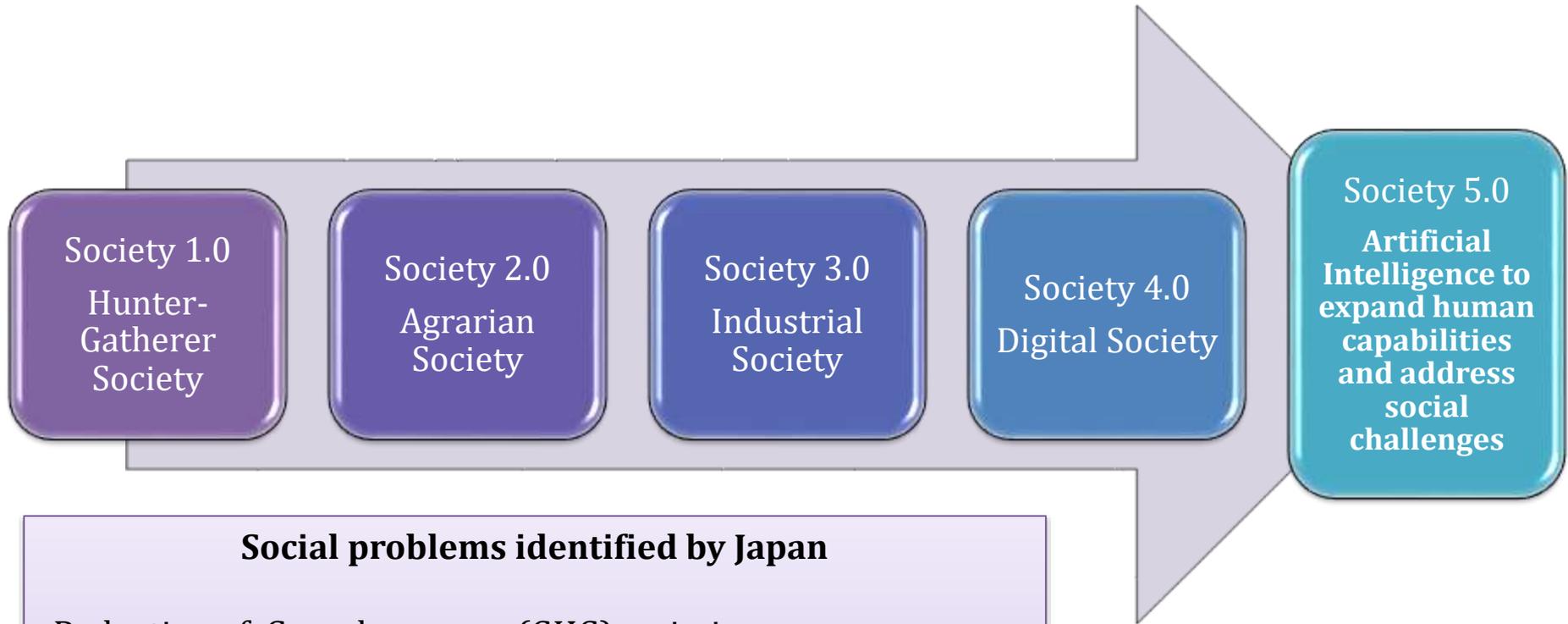


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# Objectives of the study

- ✓ An assessment of AI ecosystems across G20 countries
- ✓ Application of AI to sustainable development goals (SDGs)
- ✓ Challenges of using AI towards achievement of SDGs
- ✓ Policy recommendations and the way forward

# Introduction : Society 5.0



## Social problems identified by Japan

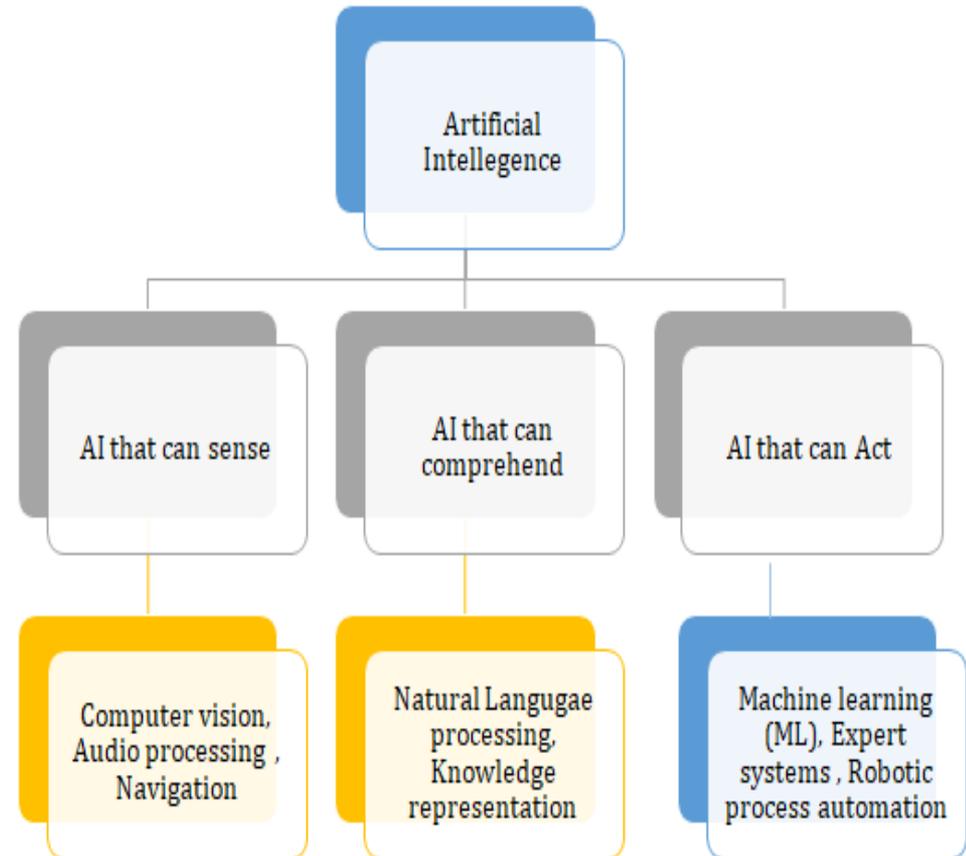
- Reduction of Greenhouse gas (GHG) emissions
- Increase production and reduce loss of foodstuffs
- Migration of costs associated with ageing society
- Promotion of sustainable industrialization
- Redistribution of wealth and correction of regional inequality

Society 5.0 was proposed in **the 5th Science and Technology Basic Plan** as a future society that Japan should aspire towards

# Artificial Intelligence (AI)

AI has characteristics of a general purpose technology (GPT) that has the ability to predict and automate pre-defined sets of tasks using and in some case generating data over a particular task (Taddy 2018)

- PWC estimates 14% additional growth (\$15.7 trillion) of global GDP over existing trends by 2030 due to AI
- Accenture predicts doubling of developed country GVAs due to AI
- AI to add US\$957 billion to India's economy in 2035 : *Accenture*

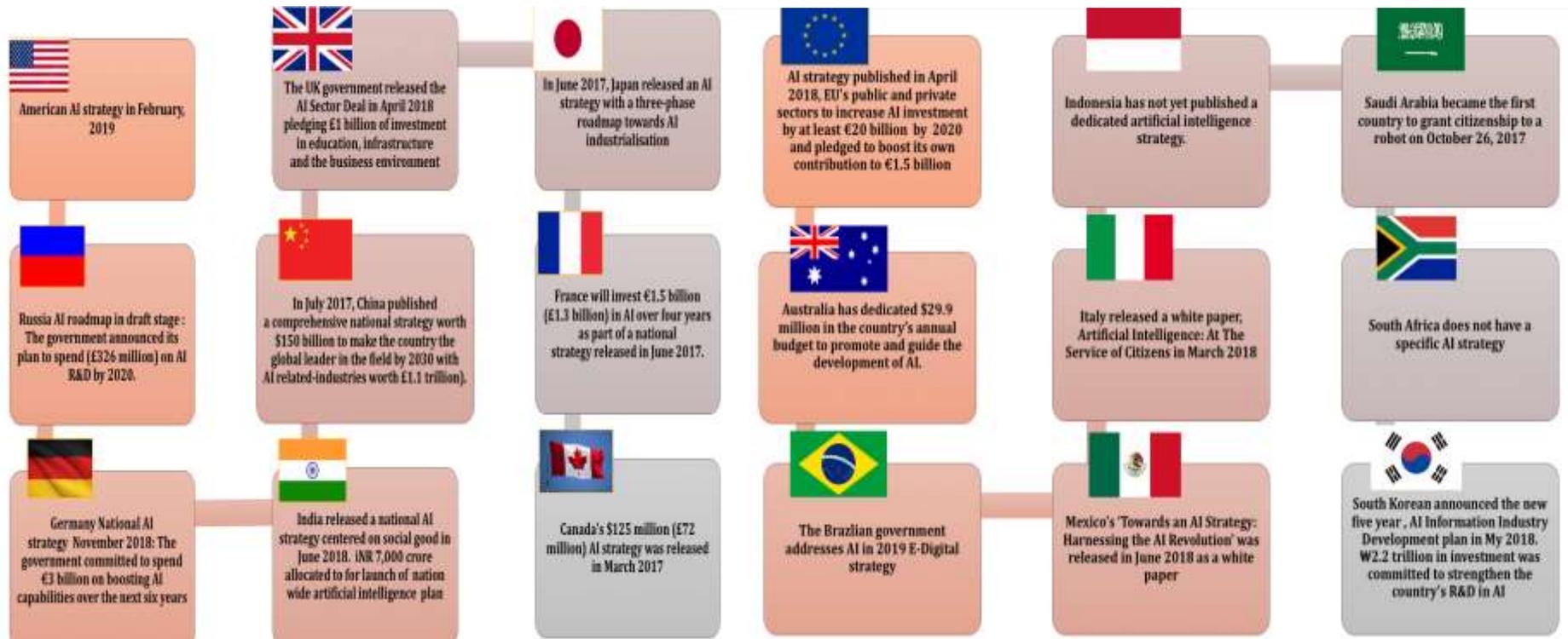


# AI in the G20

- Discussions on the digital economy began with Chinese presidency in 2016. The outcomes focused on the need to intensify efforts to measure the digital economy and its consequences to create supportive policy environments
- The German presidency (2017) also focused on the roadmap for digitisation as well as the potential of the digital economy to support the 2030 Agenda for Sustainable Development
- The Argentina presidency (2018) furthered the discussion on strengthening the digital agenda for development
- At the G20 Ministerial Meeting on Trade and Digital Economy, held on 8–9 June 2019 in Japan, the G20 Trade and Digital Economy Ministers outlined G20's commitment to a human-centred approach to AI, guided by a series of G20 AI Principles.
- These Principles have a non-binding nature and are drawn from the OECD Recommendation on AI (adopted in May 2019).
- Several G20 countries have independently proposed the creation of a council or a committee or a task force for standards and regulations on the ethical use and development of AI.
- The Osaka Track at the G20 Summit 2019 attempted to legitimise informal plurilateral negotiations on digital trade including rules on free flow of data (South Africa, India and Indonesia decided to opt out)

# Country led strategy for AI adoption and Implementation

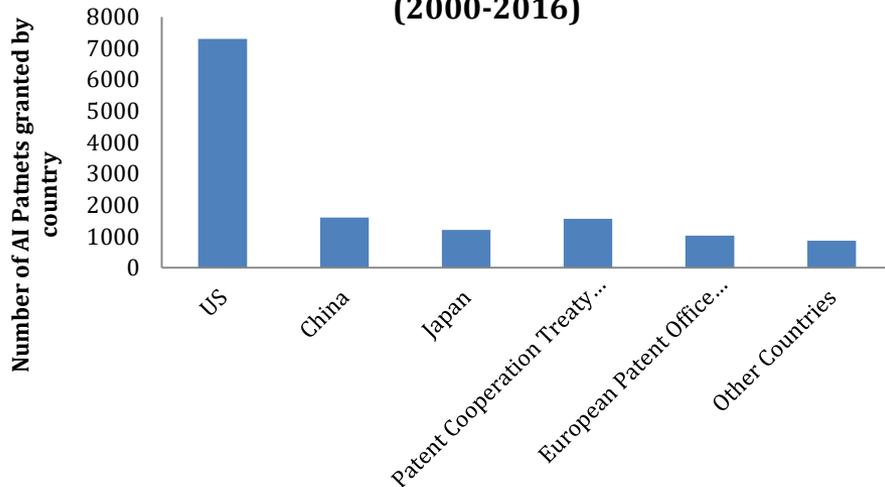
## Role of Government



- Among the countries that have a policy on AI, many have prescriptive policies with specific targets. 10 countries have also committed investments for the development and use of AI.
- G20 countries including China, India, Japan, European Union, France, Germany and United Kingdom have policies explicitly aimed at promoting social and inclusive growth.
- Indonesia has not yet published a dedicated artificial intelligence strategy. However, leading in the Asia-Pacific market in adoption of AI with 65 percent businesses responding to a survey stating, they had planned or already implemented AI solutions.
- Saudi Arabia became the first country to grant citizenship to a robot in October 2017

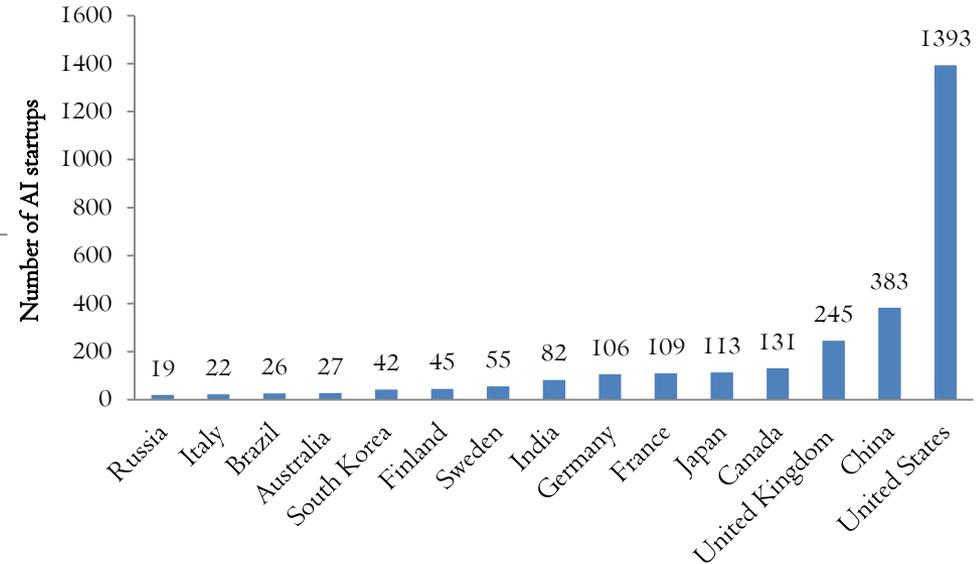
# Role of the Private Sector and Academia

**Number of AI Patents Granted by Country (2000-2016)**



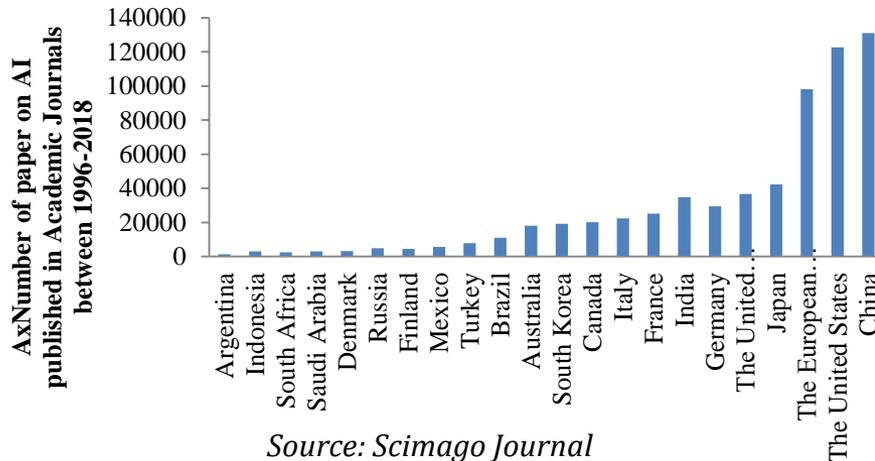
Source: WIPO 2019 Report

**Distribution of AI startups across some of the G20 countries in 2018**



Source: Data compiled from Asgard and Berger "Artificial Intelligence – A Strategy for European Startups"

**Number of paper on AI published in Academic Journals: 1996-2018**



Source: Scimago Journal

## AI patent filing in academia

- As per WIPO 2019, of the top 20 universities and public research organizations in the AI field, 17 are located in China and the remaining three in the Republic of Korea

## Private Investments in AI based startups

- Private companies dominated investment in AI with internal corporate funding accounting for USD 18 billion –USD 27 billion of total AI funding. Funding from venture capital and private equity funds amounted to approximately USD 6-9 billion, while USD 2-3 billion came from mergers and acquisition.
- United States accounts for 70-80 % of the global venture capital investment across all technologies

# AI for Good

SDG Goal	Use Cases	AI tools	Country	Impact
<b>Goal 1: No Poverty.</b>	Sustainability and Artificial Intelligence Lab: Project by Stanford University	Sensor	Rwanda, Nigeria, Uganda, Malawi and Tanzania	Feeding an algorithm with both night and day satellite images of Rwanda, Nigeria, Uganda, Malawi and Tanzania, were able to identify signifiers in the daytime pictures. Combining both image sets, this helped the computer predict poverty in these regions, with an 81-99% accuracy as compared to the night time satellite images alone.
<b>Goal 2: Zero Hunger</b>	Farmwave	Image processing	Australia	Farmwave provides smart image processing to present growers real-time feedback at every stage of crop maturity. By accessing the web app, one can use the built in tools to scan and identify pest and disease issues, or perform rapid counts for yield estimation. The app has observed 1000+downloads
<b>Goal 3: Good Health and Well-Being.</b>	Google DeepMind Health	Machine Learning	UK, Canada, USA, France	Over 100 million people are affected by diabetic retinopathy or age-related macular degeneration. These conditions can cause sight loss unless they're treated quickly. The results, which were published in Nature Medicine, showed that Deep Mind AI system could recommend patient referrals as accurately as world-leading expert doctors for over 50 sight-threatening eye diseases.
<b>Goal 4: Quality Education</b>	Liulishuo	Machine Learning	China	Liulishuo offers a personalized and adaptive language learning experience to 50 million learners in 379 cities in China and over 175 countries around the world
<b>Goal 5: Gender Equality.</b>	Textio	Natural Language Processing	USA	Australian software giant Atlassian used Textio's software for its job-ad copy which resulted in 80% increase in the hiring of women in technical roles globally over a two-year period."
<b>Goal 6: Clean Water and Sanitation.</b>	EMAGIN	Sensors	Canada	In emerging markets, Emagin has been working with utilities to support technological leapfrogging, and has successfully deployed AI in non-digitized utilities. In established markets, Emagin has supported progressing facilities beyond digitization by implementing AI to fully optimize operations and save on expenditure. After winning a series of awards locally, Emagin was recognized in the international water sector by BlueTech and Global Water Intelligence.

# AI for Good

SDG Goal	Use Cases	AI tools	Country	Impact
<b>Goal 7: Affordable and Clean Energy</b>	Ecoisme : Smart home App	Natural Language Processing	UK and used in Australia, Asia, Africa, North and South America	The startup provides an electricity bill forecast, measures the amount of electricity used by different devices, and allows one to switch their utility provider which results in saving the energy bills by 15%.
<b>Goal 9: Industry, Innovation and Infrastructure</b>	PARC	Machine Learning	Palo Alto, California, USA	PARC delivered to Olay a suite of algorithms and user experience elements and, in September of 2016, the Olay Skin Advisor platform was released. The platform enabled accurate analysis of users' skin, informed users of what was happening with their skin, suggested product and regimen changes, and provided a compelling user interaction flow. Over 4 million site visits worldwide. Users of the platform exhibited 2x the conversion rate and 40% larger basket size upon checkout as compared to regular Olay.com visitors. They also yielded 3x lower bounce rate and 4x time spent as engagement measures.
<b>Goal 10: Reduced Inequality</b>	SEEING AI- Microsoft	Sensors	56 countries	Seeing AI helps users (blind or with low vision) read printed text in books, restaurant menus, street signs and handwritten notes, as well as identify banknotes and products via their barcode. Leveraging on-device facial-recognition technology, the app can even describe the physical appearance of people and predict their mood. The app has observed 697 downloads since its launch

# AI for Good

SDG Goal	Use Cases	AI tools	Country	Impact
<b>Goal 11: Sustainable Cities and Communities</b>	PetaBencana.id	Sensors	Indonesia	Since its debut in 2013 (as PetaJakarta.org), the PetaBencana.id platform has been used by millions of resident users to make time-critical decisions about safety and navigation during emergency flood events; it has also been adopted by the National Emergency Management Agency (BNPB) to monitor flood events, improve response times, and share time-critical emergency information with residents. Currently it supports a coverage area with over 50 million residents in Jabodetabek, Surabaya, and Bandung,
<b>Goal 12: Responsible Consumption and Production</b>	OSCAR	Computer vision and Machine Learning	Canada	According to a benchmarking waste study of a university's contamination rates and with early Oscar performance in waste diversion, it is approximated that by nudging users to recycle correctly, each Oscar installed in a facility can reduce up to 10 tons of waste from being sent to landfill and thus stopping toxic chemicals from seeping into surrounding water tables
<b>Goal 13: Climate Action</b>	Grid4C	Machine Learning	USA	In a few short years they have scaled to 4 continents and are partnering with global utilities to analyze billions of meter and smart devices reads to deliver millions of predictions every day. As the #1 ranked predictive analytics solution provider in the energy industry.
<b>Goal 15: Life on Land</b>	Resolve	Image Processing and Deep Learning	United States	The TrailGuard AI technology was field-tested at the Grumeti Reserve in Tanzania, where it enabled the arrest of thirty poachers and the seizure of over 1,300 lb. of bush meat.
<b>Goal 16: Peace and Justice Strong Institutions</b>	Quantexa	Machine Learning, Deep Learning and Natural language Processing	UK	HSBC is using AI to help spot money laundering, fraud, and terrorist funding. AI enables the bank to screen the vast amounts of data it holds on customers and their transactions against publicly available data, in the search for suspicious activity.

# Challenges of using AI

## Skills and Inequality

- Studies find that tasks performed by workers that are routine in nature are most likely to be automated, leading to worker displacement and consequently a rise in inequality (*Acemoglu and Restrepo, 2018*)
- Automation is by definition labor substituting
- As a consequence the demand for high skilled will further exacerbate extant inequalities within the workforce, and between employers and employees

## Bias and Ethical Use of AI

- *Algorithmic bias* wherein AI programs systematically yields results that are discriminatory
- Achieving social justice will be more difficult as AI cannot bear any 'responsibility' or culpability for errors or for unfairly excluding victims.
- Novel AI programs are also being heavily deployed for purposes of surveillance, manipulating elections, subverting democracy, and curtailing individual liberties.

## Scalability

- Most AI applications to developmental cases are either at an experimental stage or are restricted to a particular area or demography
- Scalability of such applications is limited by access to data and crucially, on access to quality data.
- Deficiency in quality data, which is scarce, can be linked to deficiencies in institutional infrastructures that engage in collection of data sets
- Data protection regulations that, while aiming to protect individual privacy, also makes it more challenging for companies that provide AI based solutions

## **Downside Challenges of AI: Can AI hold us captives?**

- The rapid adoption of humanoids and AI enabled home companions has raised concerns on how machines may eventually replace human interaction
- Studies have found that when robots fail to reciprocate human emotions, feelings of loneliness could be exacerbated instead of alleviated
- The level of social disconnection can also endanger health. Loneliness has been alleged to have the same impact on life expectancy as smoking 15 cigarettes a day, with a risk factor that rivals excessive drinking or obesity
- Data from United States finds that the introduction of digital platforms and smartphones, has led to an increase in the suicidal rates among the youth aged 10 to 17 by 70 % between 2006 and 2016

# Way Forward and Scope for Collaboration

## Building Capacity

- The upgradation of skills requires amendments in the education curriculum
- The 'G20 Education Ministers' Declaration 2018' encouraged participation, especially of women, in STEM fields.
- Internship and Apprenticeship programs to prepare the emerging labour force for industry

## Strengthening AI Research and Development

- Forming cooperative relationships with some of the frontrunners in AI—such as US, China, Japan, UK and Germany
- Widen the scope of academic collaboration.

## Addressing Adoption of AI

- Targeted policies focused on enhancing literacy, relevant local language content and applications, affordability and availability of high speed digital infrastructure is vital for harnessing the AI ecosystem

## Building an All Encompassing Data Strategy

- Developing a generalized meta-data standard for data.gov.in will enable integration of resources including but not limited to data, tools, literature, etc.
- The experiment with Data Trusts in the UK is worthy of consideration
- Open Data has been advocated by several G20 countries including United States, France, Korea, etc.

## Ethical and Accountable AI

- Standards have the ability to influence the development and deployment of AI based systems by mandating product specifications for explainability, robustness, and fail-safe design

## Invest in Social Sector Applications

- Social sector applications may not always find immediate monetisation opportunities. There is a need for continued focus on social sector applications of AI

**Thank You !**