Google DeepMind’s SIMA and AlphaGeometry

For Prelims: Scalable Instructable Multiworld Agent, AI gaming agent, **OpenAI’s ChatGPT** and Google’s Gemini, **Generative AI.**

For Mains: Scalable Instructable Multiworld Agent, Applications of Generative AI, Issues Associated with Generative AI.

Source: IE

Why in News?

Recently, Google DeepMind has revealed its various **AI (Artificial Intelligence)** products based on **Predictive AI Models,** such as **SIMA (Scalable Instructable Multiworld Agent) and AlphaGeometry.**

- **OpenAI's ChatGPT** and **Google's Gemini** have garnered significant attention from various sectors, with companies and researchers, including those in oil and gas as well as pharmaceutical industries, increasingly turning to Generative AI **or Predictive AI** for applications such as oil exploration and drug discovery.

What is Predictive AI?

- Predictive AI models are **a type of artificial intelligence system** designed to **forecast or predict future outcomes** based on historical data, patterns, and trends.
- These models utilise advanced algorithms, statistical techniques, and machine learning methods to analyse vast amounts of data and make informed predictions about future events or behaviours.

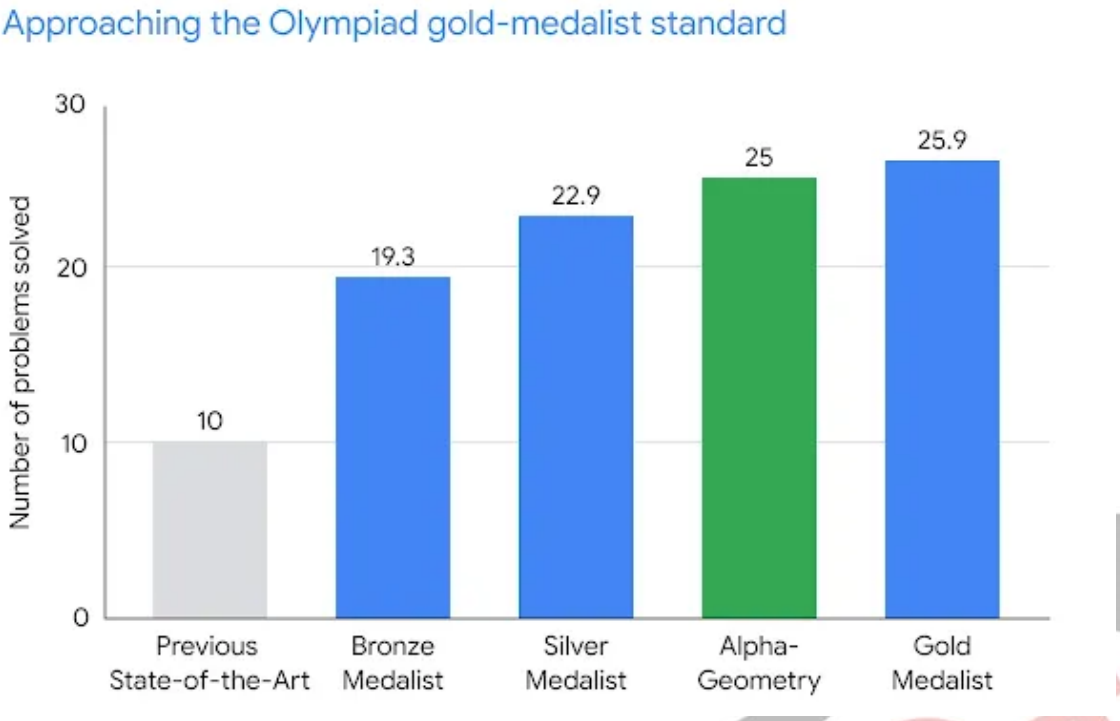
What is SIMA?

- **About:**
  - SIMA is an AI Agent, which is **different from AI models such as OpenAI’s ChatGPT or Google Gemini.**
    - AI models are **trained on a vast data set and are limited when it comes to working on their own.**
    - On the other hand, an AI Agent can process **data and take action themselves.**
  - It is a game assisting AI, making it a valuable asset for enhancing the gaming experience.
  - SIMA can be called a **generalist AI Agent that is capable of doing different kinds of tasks.**
  - It is like a virtual buddy who can understand and follow instructions in **all sorts of virtual environments** – from exploring mysterious dungeons to building **lavish castles.** It can accomplish tasks or solve challenges assigned to it.

- **Working:**
  - SIMA “understands” any person's commands as it has been trained to **process human language.** So when one asks it to build a castle or find the treasure chest, it **understands exactly what these commands mean.**
  - One **distinct feature of this AI Agent** is that it is capable of learning and adapting. SIMA does this through the interactions it has with the user.
- **Training:**
  - Google DeepMind collaborated with eight game studios to train SIMA, an AI agent, on nine different video games including Teardown and No Man’s Sky.
  - SIMA learned various skills like navigation, menu use, resource mining, and spaceship flying.
  - They also tested SIMA in **four research environments,** one of which was the Construction Lab in Unity.

What is AlphaGeometry?

- **About:**
  - DeepMind's AlphaGeometry is a **specialised AI system** designed to tackle complex geometry problems.
  - Unlike general-purpose AI models like OpenAI's ChatGPT or Google's Gemini, AlphaGeometry is **tailored specifically for geometric reasoning tasks.**
  - It combines **advanced neural language modelling techniques** with a symbolic deduction engine specialised in algebraic and geometric reasoning.
    - **Neural language models** are built using neural network architectures, which are computational models inspired by the structure and function of the human brain.
    - **Symbolic deduction** is a method of logical reasoning that operates on symbols and logical rules to derive conclusions from premises. In symbolic deduction, statements are represented using symbols, such as variables and logical operators, and logical rules are applied to manipulate these symbols according to predefined inference rules.
- **Working:**
  - It leverages both **neural language models** for intuitive idea generation and **symbolic deduction for precise reasoning.**
  - When faced with geometry problems, AlphaGeometry first utilises its language model to suggest **potential geometric constructs** that could aid in solving the problem.
  - These suggestions help inform the symbolic deduction engine, which then makes further deductions and approaches the solution systematically.
    - AlphaGeometry's performance was evaluated using a benchmarking set of geometry problems compiled from the **International Mathematical Olympiads (IMO).**
    - It demonstrated impressive results, solving a significant portion of the problems within competition time limits, surpassing previous AI systems in geometry and approaching the performance levels of human gold medallists in the IMO.



How Predictive AI Models are Gaining Traction?

- **Volcanic Ash Monitoring:**
  - Companies like Moscow-based Yandex are utilising advanced mathematical models and neural networks to **develop interactive maps for real-time monitoring of volcanic ash** dispersion.
  - This enables authorities and communities to respond swiftly to ashfall, safeguarding public safety and infrastructure.
- **Oil and Gas Exploration:**
  - Major oil and gas companies are investing in AI strategies for both upstream (exploration) and midstream (pipeline and logistics) operations.
  - AI algorithms are employed to **analyse past surveys and explorations,** identify patterns and correlations in data, predict probable reserves, optimise extraction methods, and reduce costs.
    - For instance, Shell and Saudi Aramco are leveraging **generative AI tools to improve subsurface imaging**, analyse drilling plans, and make precise forecasts for refined products.
- **Medicine Research:**
  - Deep **Neural networks** are being applied in drug discovery to develop predictive models for **assessing the properties of chemical compounds** and their potential effectiveness in targeting specific diseases.
  - Pharmaceutical companies like Merck are using **machine learning techniques to enhance drug discovery** processes, leading to the development of new models for compound assessment.
    - Collaborative initiatives such as the **European Union's (EU's)** MELLODDY Project aim to improve **predictive models through federated learning**, ensuring **data privacy and protection** while pooling resources for enhanced research outcomes.

What are India's Initiatives for Generative AI?

- **Launching the Generative AI Report:** INDIAai**,** the Government of India's National AI Portal, conducted numerous studies and **hosted three roundtable discussions** with some of the most prominent voices in Generative AI, AI Policy, AI Governance and Ethics, and academia to examine the impact, ethical and regulatory questions, and opportunities it brings to India.
- **Joining the** Global Partnership on Artificial Intelligence (GPAI)**:** In 2020, India joined forces with 15 other countries to form the GPAI. The purpose of this alliance is to establish frameworks for the

responsible utilisation of emerging technologies.

- **Fostering an AI Ecosystem within the Country:** The Indian government has been dedicated to fostering an AI ecosystem within the country **by investing in research and development, supporting startups** and innovation hubs, creating AI policies and strategies, and promoting AI education and skilling.
    - **National Strategy for Artificial Intelligence:**
        - The Government has published the National Strategy for Artificial Intelligence with the **objective of developing an ecosystem for the research and adoption of Artificial Intelligence.**
    - **National Mission on Interdisciplinary Cyber-Physical Systems:**
        - Under this Mission, Technology Innovation Hubs (TIH) has been established on Artificial Intelligence and Machine Learning at the Indian Institute of Technology (IIT) Kharagpur, which aims **to provide the state-of-the-art training and capacity building for the creation of next-generation scientists,** engineers, technicians, and technocrats in the field of Artificial Intelligence.
    - **Artificial Intelligence Research, Analytics and Knowledge Assimilation Platform:**
        - It is a **Cloud computing** platform, aiming to make India a pioneer amongst emerging economies with regards to AI and transform sectors like education, health, agriculture, urbanization and mobility.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Q1. With the present state of development, Artificial Intelligence can effectively do which of the following? (2020)

1. Bring down electricity consumption in industrial units
2. Create meaningful short stories and songs
3. Disease diagnosis
4. Text-to-Speech Conversion
5. Wireless transmission of electrical energy

Select the correct answer using the code given below:

(a) 1, 2, 3 and 5 only
(b) 1, 3 and 4 only
(c) 2, 4 and 5 only
(d) 1, 2, 3, 4 and 5

Ans: (b)

Q2. Consider the following pairs: (2018)

	Terms sometimes seen in news	**Context/Topic**
1.	Belle II experiment	Artificial Intelligence
2.	Blockchain technology	Digital/Cryptocurrency
3.	CRISPR–Cas9	Particle Physics

Which of the pairs given above is/are correctly matched?

(a) 1 and 3 only
(b) 2 only
(c) 2 and 3 only
(d) 1, 2 and 3

Ans: (b)