THE HINDU ANALYSIS

14th March 2024

by saurabh pandey

THE HINDU

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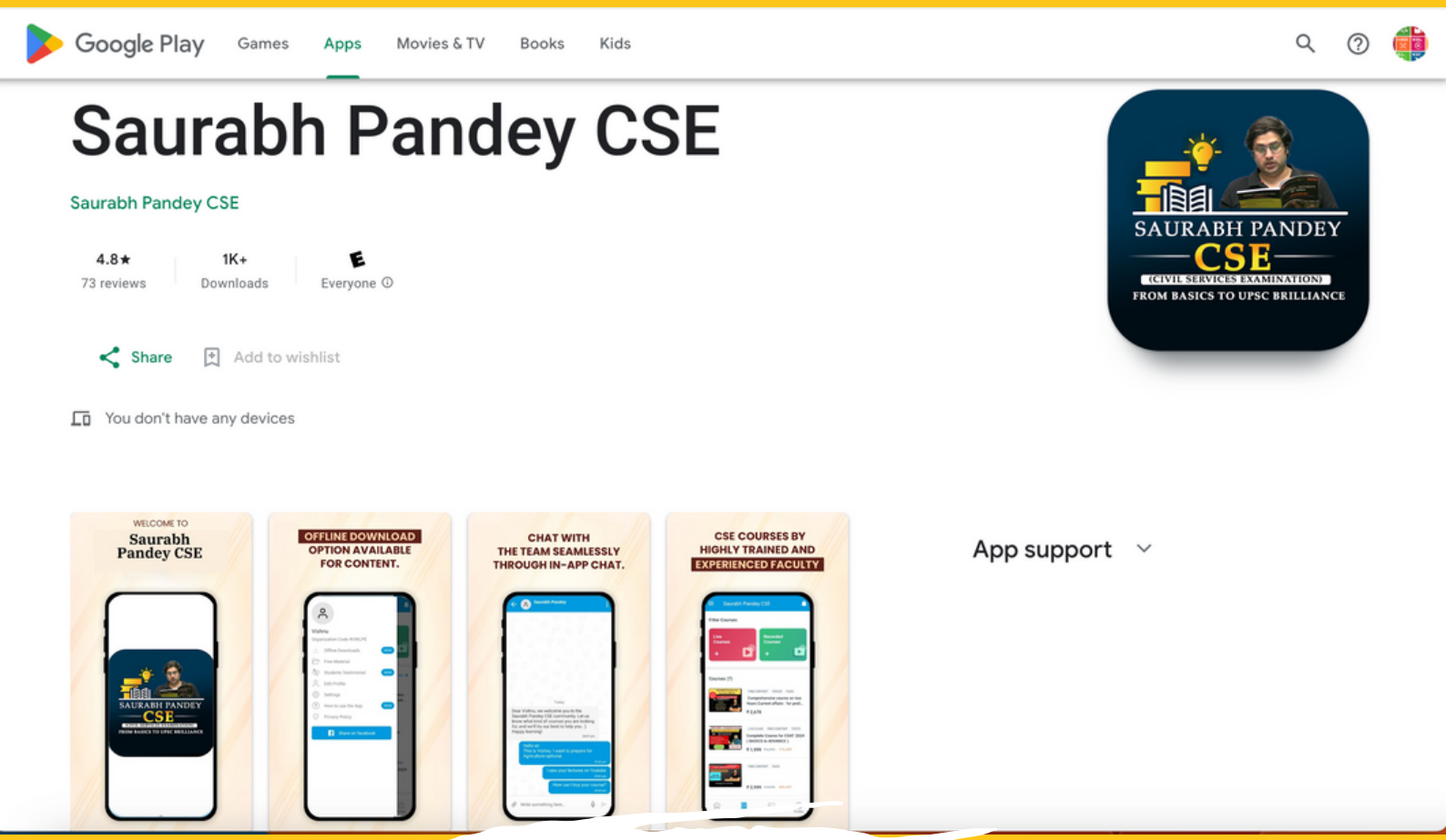

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Alpha Geometry

AlphaGeometry and the threat of AI's takeover of mathematics

Google's machine was able to solve 25 out of 30 Olympiad-level geometry problems and could also write human-readable proofs and draw diagrams to explain a proof. According to a U.S. Mathematical Olympiad coach, this performance exceeds that of an average silver medallist

Mohan R.

A few weeks ago, an animated discussion unfolded in a WhatsApp group whose members are mathematicians interested in the Indian Mathematical Olympiad. The spark was a *Nature* paper that announced a Google DeepMind artificial intelligence (AI) named AlphaGeometry had achieved a milestone: it could solve geometry problems at the level of the International Mathematical Olympiad, nearly matching the prowess of gold medallists.

The news evoked a mix of awe, fear, and wonder among us, especially in light of how AI tools like ChatGPT have started to reshape education. Some mathematicians wondered if the advent of AlphaGeometry signals the start of AI's ascendancy in mathematics.

Is this truly the beginning of an AI takeover in mathematics? To answer this question, let's take a look at the inner workings of AlphaGeometry.

AlphaGeometry stands apart because of its 'Deductive Database' — a method that significantly reduces the number of steps in a proof. GETTY IMAGES/ISTOCKPHOTO

How does mathematical logic work?

The *Nature* paper was coauthored by two computer scientists at New York University and two DeepMind researchers. AlphaGeometry is one of DeepMind's array of AI systems – perhaps the most popular of which is AlphaZero, a deep-learning algorithm that excels at playing chess. Programs like these are part of researchers' efforts to work up a ladder of complexity, building tools that can perform more complex tasks with better reliably.

The AlphaGeometry team has published supplementary information describing the proofs generated by AlphaGeometry for some geometry problems, showcasing its ability to create hundreds of logical steps in proof construction.

Let's start with a simple example from school mathematics. Suppose we only know that for any number a, $a + 0 = a$. From this, we will be able to prove that for any number a × 0 = 0. How? If a + 0 = 0 for any number a, then we should have 0 + 0 = 0. Thus a × 0 can be written as a × (0 + 0), which is the same as a × 0 + a × 0. So we have the equality a × 0 = (a × 0) + (a × 0). Cancelling a × 0 on both sides of the equation, we can conclude that a × 0 = 0.

Here, the entire proof is simply derived from the hypothesis using the rules of logic. Many computer programs can execute such a process but AlphaGeometry stands apart because of its 'Deductive Database' – a method that significantly reduces the number of steps in a proof.

What is 'Deductive Database'?

Suppose we are given a statement A, and we want to deduce the statement Z. The program can spit out all possible next steps – let's call them B – that can be deduced from A using the rules of logic. Then it will spit out all possible next steps C that can be deduced from B, and so on. If there are only finitely many steps possible, then it should reach the conclusion Z at some point. But once it reaches Z, it will perform a 'traceback' process to find the proof that takes the minimum number of steps.

So much for arithmetic and logic; geometry requires something more. In geometry, we use algebraic relations between different kinds of measures to find new relations. For example, we will have used simple techniques in school geometry called 'angle chasing', 'ratio chasing' and 'distance chasing'.

To illustrate the meaning of these ideas, let us take an example from school geometry. Let a, b, and c be three lines on a plane. If we know the angle between a and b and the angle between b and c, we can immediately determine the angle between a and c (see figure 1). This is an example of 'angle chasing'. Similarly, AlphaGeometry can quickly discover all possible algebraic relationships between some given quantities using its 'Algebraic Rules' program.

When it combines its 'Deductive Database' and 'Algebraic Rules' programs, AlphaGeometry can write complete proofs for most school-level geometry problems.

For example, let A, B, C, and D be any four points on a plane (see figure 2). Suppose by angle chasing we know that the angle between the lines AB and BD is equal to the angle between the lines AC and CD.

Then 'Deductive Database' can immediately figure out all the four points lie on a circle while 'Algebraic Rules' can determine that the angle between the lines BC and CA is equal to the angle between the lines BD and DA.

What are auxiliary constructions?

The combination of these two programs makes AlphaGeometry a very powerful tool. The AlphaGeometry team could solve 14 of the 30 geometry problems in the International Mathematical Olympiad in this way.

This achievement also reveals that a significant amount of difficulty in these problems was not in terms of the ingenuity required to solve them but in the ability to deduce the most number of relations – and computers are better at this than humans.

Fortunately, this ability is not sufficient to prove all problems in geometry, but AlphaGeometry seems to have summited this peak as well.

Mathematics is really a creative field because mathematicians often come up with clever constructions to solve a problem. Their name for such a construction is an auxiliary construction. Auxiliary constructions are not part of what is 'given' to us nor what we want to prove, and also illustrate what makes automatic theorem proving difficult. There are infinite ways to build constructions, and human intelligence is required to judge which one to choose for a given problem and how to use it.

> The success of this project will certainly lead to the development of AI programs that can efficiently do mathematics at least at the school level

There is a classic example: some 2,000 years ago, Euclid proved that there are infinitely many prime numbers. His proof goes as follows: suppose there are only finitely many primes numbers, say $p_1, p_2, ..., p_n$. Take the product of all these primes and add 1 to the product. Let's call this new number p. That is, $p = p_1 p_2 ... p_n + 1$. The question now is whether p is a prime.

If p is a prime, and since p is bigger than all the other primes, we have a new prime. However, this shouldn't be possible because we assumed originally that there is only a finite number of primes. If p is not a prime, we will be forced to conclude that one of the primes should divide 1, which is absurd. In sum, assuming there is a number of primes leads us to absurdity, which means there have to be infinitely many primes.

The auxiliary construction in this proof is constructing the number p.

There are no particular restrictions for how we can come up with different constructions, and thus different ways to solve the problem. They simply require experience and deep insight.

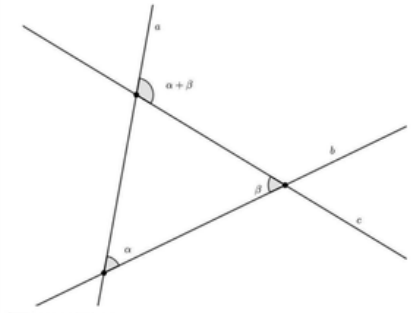


Figure 1. SPECIAL ARRANGEMENT

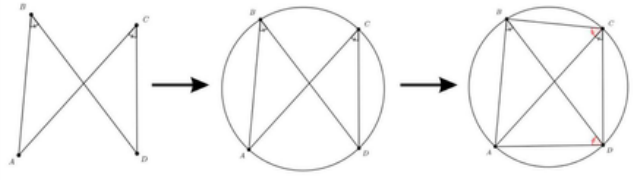


Figure 2. SPECIAL ARRANGEMENT

What is the significance?

Invariably, most geometry proofs require auxiliary constructions. Large language models like GPT-4, which is behind ChatGPT, can be taught to come up with possible constructions. One can train them to use rule-sets from different fields to build auxiliary constructions and use them to write proofs. However, there is no guarantee that the new constructions they devise will be able to lead to new proofs.

But when the AlphaGeometry team combined GPT-4 with 'Deductive Database' and 'Algebraic Rules', the program could produce auxiliary constructions for geometry problems, with no prior human demonstration. This is a new development in the field, and in this sense, AlphaGeometry seems like a big step towards AI's takeover of mathematics, which has thus far been a very human enterprise.

In all, AlphaGeometry could solve 11 more Olympiad geometry problems, bringing its tally to 25 out of 30 problems. It is also commendable that AlphaGeometry can write human-readable proofs and can draw diagrams to explain a proof. Once it did so, the team asked a coach of the U.S. Mathematical Olympiad to evaluate the proofs and grade them. The result: AlphaGeometry performed better than an average silver medallist.

The architecture developed for AlphaGeometry may not have been able to solve the other Olympiad problems, but the techniqaes it developed are directly useful to solve problems from other areas of mathematics. The success of this project will certainly lead to the development of AI programs that can efficiently do mathematics at least at the school level.

(Mohan R. is a mathematician at Azim Premji University, Bengaluru.)

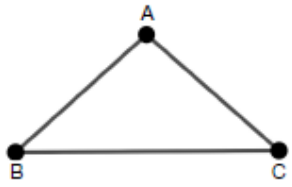
ALPHA GEOMETRY

- This innovative neuro-symbolic system combines the strengths of a neural language model with those of a symbolic deduction engine, allowing it to mimic human-like reasoning capabilities.
- By generating “fast, intuitive” ideas through the neural model and refining them with the “deliberate, rational” decision-making process of the symbolic engine, AlphaGeometry demonstrates an uncanny ability to navigate the intricate landscape of geometric proofs.
- This unique approach not only allows for more efficient and accurate solutions but also sheds light on the potential of AI to emulate human reasoning and problem-solving, bringing us one step closer to unlocking the full potential of artificial intelligence in various fields

The hindu analysis by saurabh pandey sir

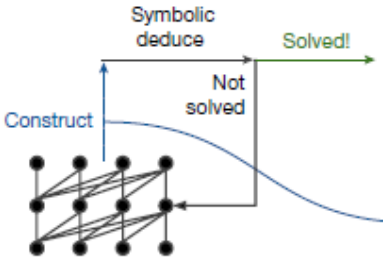
THE HINDU

a A simple problem



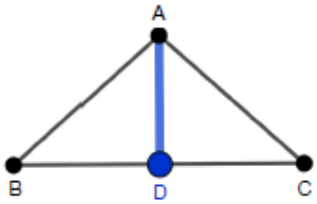
"Let ABC be any triangle with AB = AC. Prove that ∠ABC = ∠BCA."

b AlphaGeometry



c Language model

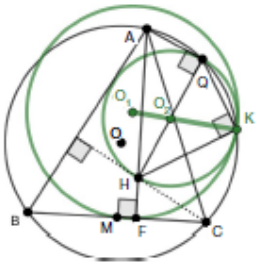
d Solution



`Construct D: midpoint BC,`
`AB=AC, BD = DC, AD=AD ⇒ ∠ABD=∠DCA [1]`
`[1], B C D collinear ⇒ ∠ABC=∠BCA`

e IMO 2015 P3

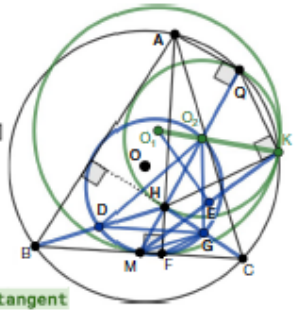
"Let ABC be an acute triangle. Let (O) be its circumcircle, H its orthocenter, and F the foot of the altitude from A. Let M be the midpoint of BC. Let Q be the point on (O) such that QH ⊥ QA and let K be the point on (O) such that KH ⊥ KQ. Prove that the circumcircles (O_1) and (O_2) of triangles FKM and KQH are tangent to each other."



Alpha-Geometry

f Solution

...
`Construct D: midpoint BH [a]`
`[a], O₂ midpoint HQ ⇒ BQ // O₂D [20]`
...
`Construct G: midpoint HC [b]` ...
`∠GMD = ∠GO₂D ⇒ M O₂ G D cyclic [26]`
...
`[a],[b] ⇒ BC // DG [30]`
...
`Construct E: midpoint MK [c]`
`..., [c] ⇒ ∠KFC = ∠KO₁E [104]`
...
`∠FKO₁=∠FKO₂ ⇒ KO₁ // KO₂ [109]`
`[109] ⇒ O₁O₂K collinear ⇒ (O₁)(O₂) tangent`



Solar photo voltaics have inherent limitations which are the subject of research. FILE PHOTO

Overcoming theoretical limits on solar cell capacity

Priyali Prakash

In photovoltaics - i.e. the study of conversion of light energy into electrical energy – the Shockley-Queisser limit is a theoretical concept that defines the maximum capacity of a solar cell to produce electricity.

The Sun is the primary source of light and energy on the earth. Photovoltaic devices like solar cells allow us to harness this energy. Photovoltaic cells are made of semiconducting materials like (doped) silicon. When sunlight interacts with a semiconductor, it excites electrons from the lower-energy valence band to the higher-energy conduction band.

This transition leaves behind a vacancy in the valence band called a hole. (To be more precise, a hole is a vacant site where an electron is supposed to be. Since it denotes the absence of an electron, a hole is also a place with positive charge.)

The process of an electron moving to the conduction band and leaving a hole behind in the valence band creates an electron-hole pair. These pairs are the fundamental charge carriers in

Researchers have been trying to surpass the Shockley-Queisser limit and use more solar energy, and thus improve the cells' efficiency, but this has been easier said than done

semiconductors and play a crucial role in the operation of electronic devices.

In short, electron-hole pairs create the photocurrent – an electric current created as a result of radiation – in the semiconductor.

We know that the efficiency with which a solar cell can produce an electric current when sunlight is incident on it can't be 100% because some light particles (photons) pass through the material without interacting with it (i.e. transparency loss, around 25%) and some energy simply heats up the material without exciting the electrons (thermalisation, around 30%). As a result, the maximum efficiency of a conventional solar cell is confined, and this range is called the Shockley-Queisser limit. It is named after the physicists William Shockley (of the U.S.) and Hans-Joachim Queisser (Germany).

These days, a solar cell can convert only a third of the incident solar energy into electric energy. The semiconductor can't make use of photons with less energy than that required by electrons to jump across the band gap. Similarly, photons carrying significantly more energy than the size of the band gap only heat the device.

Researchers have been trying to find ways to surpass the Shockley-Queisser limit and use more solar energy, and thus improve the cells' efficiency, but this has been easier said than done.

South Korean physicist Young Hee Lee has said carrier multiplication and hot carrier extraction are two promising pathways. In the former, a cell allows a photon to create multiple electron-hole pairs. The latter aims to quickly capture photons with 'too much' energy before they dissipate as heat.

The hindu analysis by saurabh pandey sir

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On judges and bureaucrats joining politi

What are the restrictions on judges and senior government officials with respect to their employment when it comes to other posts within the government or in the private sphere? Can a former judge join a political party and contest elections?

EXPLAINER

Rangarajan. R

The story so far:

Recently a Calcutta High Court judge and a senior IPS officer in West Bengal resigned from their posts and joined political parties. This has once again raised questions of propriety about independent constitutional authorities and other senior government officials joining political parties after demitting office.

What are constitutional restrictions?

The Constitution works on the principle of checks and balance between various organs. The executive is accountable to the legislature. An independent judiciary keeps a check on both these branches of the State. There are also other independent bodies like the Election Commission, Public Service Commission, Comptroller and Auditor General (CAG) who are required to perform their constitutional duties without any interference from the government. The independence of these institutions is ensured through guaranteeing fixed tenure, financial independence, stringent removal procedure and restrictions after demitting office. A judge of a Supreme Court after ceasing to hold office cannot appear as a lawyer before any court or authority in India. A judge of a High Court has similar restrictions except for appearance before the Supreme Court or other High Courts. The CAG and the chairman/members of the Public Service Commission cannot take up any other employment with Central or State governments after demitting office. These restrictions are laid down to avoid favouritism, during the period of holding such positions, towards the government in power with an intent of securing any post-retirement benefit.

What about political posts?

There are no restrictions when it comes to joining political parties, contesting elections or being nominated to certain posts. There are notable instances of persons who held independent constitutional posts and later went on to join politics or were nominated to various posts. There have been two Supreme Court judges in 1967 and 1983, who resigned from their posts to contest the presidential and parliamentary elections from Assam, respectively. Another Supreme Court judge joined a political party in Tamil Nadu and contested elections five years after his retirement in 1999. A former Chief Election Commissioner became a Rajya Sabha member and Minister in 2004, three years after his retirement. Recently, a retired Chief Justice of India was nominated to the Rajya Sabha in 2020 within four months of his retirement.

Necessary safeguards: Former Calcutta High Court judge Justice Abhijit Gangopadhyay joins the Bharatiya Janata Party (BJP) in Kolkata on March 7. ANI

There have also been occasions where retired CAG and judges have been appointed as Governors of States. Numerous bureaucrats have also joined political parties and contested elections after resigning from service or soon after their retirement.

What are the recommendations?

The Election Commission had in 2012 recommended to the Union government to provide for a cooling-off period for top bureaucrats after their retirement before they could join political parties and contest elections. However, the Government had rejected this recommendation based on the opinion of the Attorney General that this may not be in line with constitutional provisions and democratic values. The Supreme Court had dismissed a writ petition in May 2022 that sought a direction from the top court to the legislature to frame a law imposing a cooling-off period for retired bureaucrats before joining politics. The court observed that it is for the legislature to determine whether a cooling-off period is required for bureaucrats before they join politics after retirement.

Is a cooling-off period desirable?

One of the essential features of a democracy is every citizen's right to contest elections. The Attorney General while providing his opinion against the 2012 recommendation of Election Commission had said that maintenance of independence and neutrality will be relevant during the period a person is in service. There are rules at present which restrict a senior bureaucrat from joining a private job for at least one year after he or she retires from government service. The Attorney General had opined that such restriction for commercial employment is based on intelligible differentia to avoid conflicts of interest. However, such a restriction against officials contesting polls may not be a valid classification and would not be in harmony with democratic principles in the Constitution.

While the opinion of Attorney General is based on sound legal principle, it is equally imperative to remember the famous judicial quote that 'justice should not only be done but should also be seen to be done'. This applies equally to judges, independent constitutional authorities and senior bureaucrats. It is an indispensable trait while discharging their official functions. Extending this principle even after they demit office will have a salutary effect. This may be achieved by prescribing a cooling-off period of say at least two years for joining political parties or being nominated to political posts by the government. This will instil confidence in the public at large and negate any allegation of quid pro quo.

Rangarajan. R is a former IAS officer and author of 'Polity Simplified'. He trains civil-service aspirants at 'Officers IAS Academy'. Views expressed are personal.

THE GIST

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JUDGES JOINING POLITICS

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India and EFTA

A fresh stance

India's free trade pact with four EU nations matters even if gains are limited

On Sunday, India signed a Trade and Economic Partnership Agreement (TEPA) with a bloc of four European countries – Iceland, Liechtenstein, Norway and Switzerland, formally known as the European Free Trade Association (EFTA). The pact has been in the works since 2008 but slipped off India's to-do list after the UPA government's exit. In market access terms, the deal offers more room for Indian services firms, with easier visa rules, so that they can also tap other European markets using these countries as a base. Professionals (architects, accountants and nurses), can also expect more opportunities. Most goods exports already get duty-free treatment in Switzerland, India's largest EFTA trade partner, so the lynchpin in this deal is the in-built goal to nudge $100 billion of fresh foreign direct investment into India and create a million jobs over 15 years. Indian consumers can expect cheaper wines and chocolates, while producers may access cheaper machinery. India's tariff cuts are linked to investment inflows, but a full assessment of those outcomes will only happen after 20 years, so persistent hard work is needed on both sides to realise these goals.

For India, the speed with which the EFTA deal has been dusted off and sealed within months of resuming negotiations is creditable. It constitutes the second major trade pact in recent years since the deal with the United Arab Emirates, and the first such arrangement with a western nations' grouping. An interim deal with Australia that kicked in late 2022, is yet to be followed through to a comprehensive agreement. Parleys for a deal with the Gulf Cooperation Council, mooted since 2004, are yet to take off. A deal with Canada has been waylaid by political frictions. Talks are on with the European Union (EU) and the United Kingdom, with the latter likely in the last mile. The EFTA deal assumes greater symbolic significance than the size of trade flows involved. It signals that India's apparent aversion to such trade pacts since 2014, capped by its walkout from the Regional Comprehensive Economic Partnership in 2019, is likely a thing of the past. A country that has often been criticised for its high import tariffs and protectionist approach, now seems willing and able to walk the talk on free trade when many nations are turning protectionist. The EFTA pact, expected to be ratified by the end of 2024, also marks the first time that India has agreed to include non-trade issues such as labour, human rights, environment and gender in an economic agreement. Whether the inclusion of these issues in trade deals is necessary can be debated, but this is a positive augury for potential allies such as the EU that consider them critical.

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EUROPEAN FREE TRADE ASSOCIATION

EFTA-INDIA TRADE AND ECONOMIC PARTNERSHIP AGREEMENT

New Delhi, 10 March 2024 – India and EFTA sign Trade and Economic Partnership Agreement

Today, the European Free Trade Association (EFTA) States – Iceland, Liechtenstein, Norway, and Switzerland – and India signed a Trade and Economic Partnership Agreement (TEPA). The landmark agreement between India and EFTA is set to bring significant economic benefits, such as better integrated and more resilient supply chains, new opportunities for businesses and individuals on both sides leading to increased trade and investment flows, job creation, and economic growth.

At the signing ceremony, Federal Councillor Guy Parmelin, speaking on behalf of the EFTA Member States, stated that *"EFTA countries gain market access to a major growth market. Our companies strive to diversify their supply chains while rendering them more resilient. India, in return, will attract more foreign investment from EFTA, which will ultimately translate into an increase in good jobs. […] All in all, the TEPA will allow us to make better use of our economic potential and create additional opportunities for both India and the EFTA States".*

The agreement enhances market access and simplifies customs procedures making it easier for Indian and EFTA businesses to expand their operations in the respective markets. The agreement further aims to facilitate and promote investment opportunities between the Parties.

The EFTA-India TEPA was signed by Shri Piyush Goyal, Minister of Commerce & Industry, Consumer Affairs & Food & Public Distribution and Textiles of India; Guy Parmelin, Swiss Federal Councillor and Head of the Federal Department of Economic Affairs, Education and Research; Bjarni Benediktsson, Minister of Foreign Affairs, Iceland; Dominique Hasler, Minister of Foreign Affairs, Liechtenstein and Jan Christian Vestre, Minister of Trade and Industry, Norway.

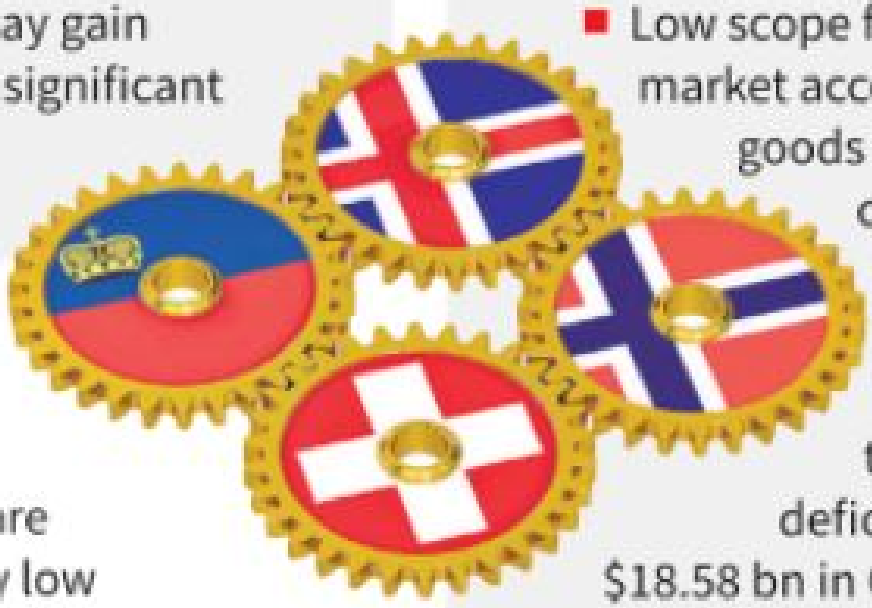
The signature of this agreement marks a significant milestone in the relationships between the EFTA States and India. It reflects the culmination of dedicated efforts to foster a deeper economic partnership, underscoring the importance of dialogue, cooperation, and mutual understanding.

India and EFTA

Power of four

India's gains from the proposed FTA with the 4-nation EFTA will mostly flow from the $100-bn investment promised by the bloc

- Goods exports may gain minimally due to insignificant existing tariffs, GTRI says
- Tariffs in Switzerland, Iceland, Norway and Liechtenstein are already zero or very low



- Low scope for raising market access for goods in EFTA could be a concern as India had a trade deficit of $18.58 bn in CY23

WIN-WIN DEAL

- No effective duty cut on gold
- Swiss watches, chocolates, wines, coffee from EFTA to get cheaper
- Both sides keep most dairy, agri products on sensitive list
- No TRIPS-plus commitment by India

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THE HINDU

A LOT AT STAKE

Key concern:
Proposal to introduce 'data exclusivity'

THE PROPOSAL MIGHT...

...**delay registration of generic versions** of new medicines or new formulations for a set period

...**expand pharmaceutical industry's monopolies and profiteering** by blocking the availability of generics from India

...result in generic manufacturers either needing to **wait out the exclusivity period or repeat expensive clinical trials**

...**block compulsory licences** that may be granted to generic manufacturers in case of a new patent

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Mapping

Dreaming up volcano

Smoke billows from the Popocatepetl volcano in Mexico on Tuesday. A ceremony was led by the 69-year-old Don Antonio Analco Sevilla, who is believed to have the ability to talk with the volcano in his dream. Worshippers bring food to offer to the volcano for the ceremony. AFP

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- Popocatépetl is an active stratovolcano located in the states of Puebla, Morelos, and Mexico in central Mexico.
- It lies in the eastern half of the Trans-Mexican volcanic belt.
- At 5,393 m it is the second highest peak in Mexico, after Citlaltépetl (Pico de Orizaba) at 5,636 m (18,491 ft).
- It is linked to the twin volcano of Iztaccihuatl to the north by the high saddle known as the "Paso de Cortés".
- Izta-Popo Zoquiapan National Park, wherein the two volcanoes are located, is named after them.
-

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Papua New Guinea

Leader of the Palinau Alliance signs the deal in the presence of the police in Port Moresby on Wednesday. AFP

Warring tribes in Papua New Guinea sign ceasefire deal

Agence France-Presse
PORT MORESBY

Warring tribes in Papua New Guinea negotiated a temporary ceasefire on Wednesday, agreeing to halt a spiralling series of revenge killings in the country's remote highlands.

Years of tit-for-tat fighting in Papua New Guinea's central Enga province has escalated in recent months, with as many as 64 tribespersons killed during a single grisly ambush in February.

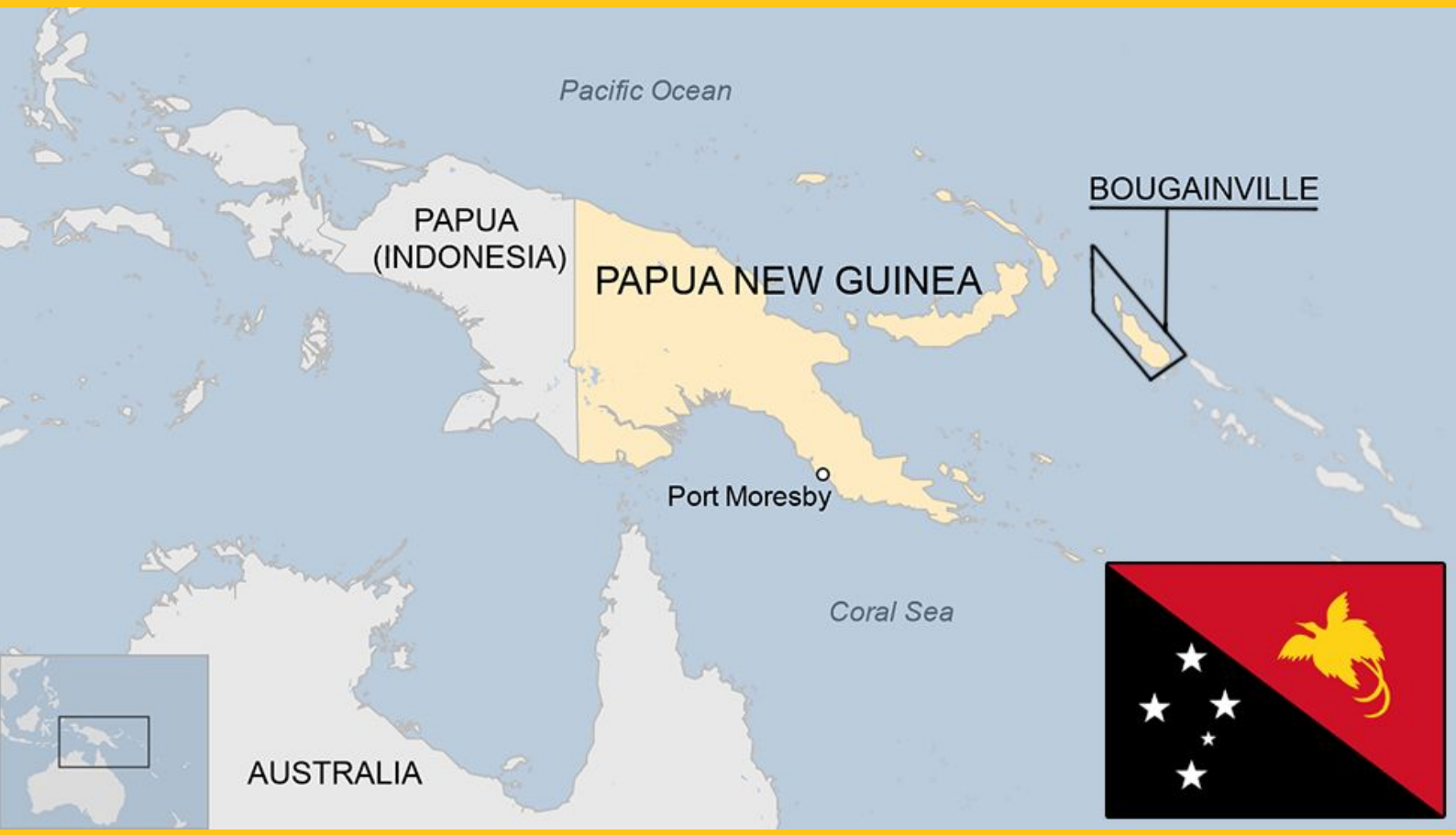
Two feuding factions – known as the Yopo Alliance and the Palinau Alliance – met in the capital of Port Moresby on Wednesday to hammer out a three-month ceasefire.

The agreement, said that the running clashes had resulted in "the displacement of thousands of people" leading to a "humanitarian crisis".

"Both fighting factions agree to lay down arms and cease and desist from all forms of hostile engagements," read the agreement, signed by tribal leaders and police.

The pact acknowledged "the many lives that have been lost on both sides" and "the massive destruction of homes, livelihoods, land and property".

Highland clans have fought each other in Papua New Guinea for centuries, but an influx of mercenaries and automatic weapons has inflamed the cycle of violence.



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US RESOLUTION ON AI

U.S. to moot first-of-its-kind resolution at UN seeking equal global access to AI

The draft resolution, which recognises the rapid acceleration of AI development and use, aims to close the digital divide between countries; it plans to make sure that nations have necessary capabilities to take advantage of the technology when it comes to detecting diseases and predicting floods

Associated Press
UNITED NATIONS

The United States is spearheading the first United Nations resolution on artificial intelligence, aimed at ensuring that the new technology is "safe, secure and trustworthy" and that all countries, especially those in the developing world, have equal access.

The draft General Assembly resolution aims at closing the digital divide between countries and making sure they are all at the table in discussions on AI – and that they have the technology and capabilities to take advantage of its benefits, including detecting diseases, predicting floods and training the next generation of workers.

The draft recognises the rapid acceleration of AI development and use, and stresses "the urgency of achieving global consensus on safe, secure and trustworthy artificial intelligence systems." It also recognises that "the governance of artificial intelligence systems is an evolving area" that needs further discussions on possible governance approaches.

Shaping the future: Unlike Security Council resolutions, General Assembly resolutions are not legally binding but they are an important barometer of world opinion. AP

U.S. National Security Advisor Jake Sullivan said the United States turned to the General Assembly "to have a truly global conversation on how to manage the implications of the fast-advancing technology of AI."

'Global support'

The resolution "would represent global support for a baseline set of principles for the development and use of AI and would lay out a path to leverage AI systems for good while managing the risks," he said in a statement. If approved, Mr. Sullivan said, "this resolution will be a historic step forward in fostering safe, secure and trustworthy AI worldwide."

The U.S. began negotiating with the 193 UN member nations about three months ago, spent hundreds of hours in direct talks with individual countries, 42 hours in negotiations and accepted input from 120 nations, a senior U.S. official said. The resolution went through several drafts and achieved consensus support from all member states this week and will be formally considered later this month, the official said, speaking on condition of anonymity because he was not authorised to speak publicly.

Unlike Security Council resolutions, General Assembly resolutions are not legally binding but they are an important barometer of world opinion.

A key goal, according to the draft resolution, is to use AI to help spur progress toward achieving the UN's badly lagging development goals for 2030, including ending global hunger and poverty, improving health worldwide, ensuring quality secondary education for all children and achieving gender equality.

'Develop frameworks'

The draft resolution encourages all countries, regional and international organisations, technical communities, civil society, the media, academia, research institutions and individuals "to develop and support regulatory and governance approaches and frameworks" for safe AI systems. It warns against "improper or malicious design, development, deployment and use of artificial intelligence systems, such as without adequate safeguards or in a manner inconsistent with international law."

Lawmakers in the European Union are set to give final approval to the world's first comprehensive AI rules on Wednesday. Countries around the world, including the U.S. and China, or global groupings like the Group of 20 industrialised nations also are moving to draw up AI regulations.

The U.S. draft calls on the 193 UN member states and others to assist developing countries to access the benefits of digital transformation and safe AI systems. It "emphasises that human rights and fundamental freedoms must be respected, protected and promoted throughout the life cycle of artificial intelligence systems."

U.S. Ambassador Linda Thomas-Greenfield recalled President Joe Biden's address to the General Assembly last year where he said emerging technologies, including AI, hold enormous potential.

She said the resolution, which is co-sponsored by dozens of countries, "aims to build international consensus on a shared approach to the design, development, deployment and use of AI systems," particularly to support the 2030 UN goals.

The resolution responds to "the profound implications of this technology," Thomas-Greenfield said, and if adopted it will be "an historic step forward in fostering safe, security and trustworthy AI worldwide."

The hindu analysis by saurabh pandey sir

US RESOLUTION ON AI

Saurabhpandeyupsc.com

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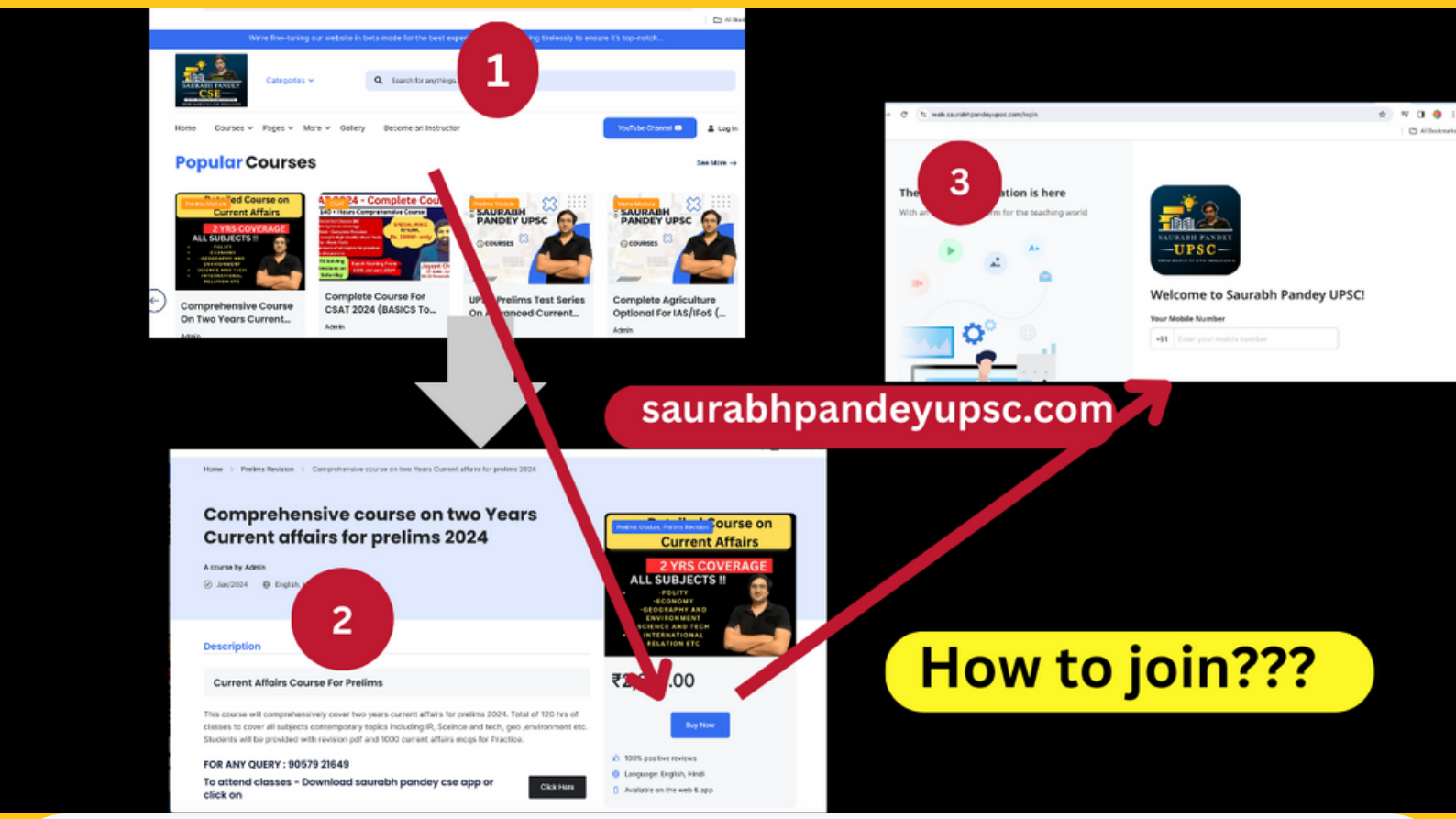

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