Prelim Bits 12-05-2023 | UPSC Daily Current Affairs

Mpox

WHO declares end to viral disease 'mpox' public health emergency.

- **Viral –** Mpox is a rare disease caused by infection with the mpox virus.
- Mpox virus is part of the same family of viruses as variola virus, the virus that causes smallpox.
- **Symptoms –** Mpox symptoms are similar to smallpox symptoms, but milder, and mpox is rarely fatal.
- Mpox is not related to chickenpox.
- Mpox was discovered in 1958 when two outbreaks of a pox-like disease occurred in colonies of monkeys kept for research.
- **Source –** Despite being named monkeypox, the source of the disease remains unknown.
- However, African rodents and non-human primates (like monkeys) might harbor the virus and infect people.
- The first human case of mpox was recorded in 1970.
- **Types –** There are two types of mpox virus: Clade I and Clade II.
- Infections in the current outbreak are from Clade II, or more specifically, Clade IIb.
- Infections with Clade IIb are rarely fatal.

References

1. Business Standard | WHO declares end to viral disease 'mpox' public health emergency
2. CNN | WHO says mpox is no longer a global health emergency

Transformer in ChatGPT

The capital 'T' in ChatGPT stands for 'transformer'.

- **Machine Learning –** It is a subfield of artificial intelligence that teaches computers to solve tasks based on structured data, language, audio, or images, by providing examples of inputs and the desired outputs.
- This is different from traditional computer programming, where programmers write a sequence of specific instructions.
- ML has a history of developing methods with hand-crafted features that may work only for specific, narrow problems.
- There are several such examples. In text, classifying a document as scientific or literary may be solved by counting the number of times certain words appear.
- In audio, spoken text is recognised by converting the audio into a time-frequency representation.

- In images, a car may be found by checking for the existence of specific car-like edge-shaped patterns.
- **Deep neural networks –** In the first part of the 2010s, deep neural networks (DNNs) took over ML.
- DNNs ingest a complete document or image and generate a final output, without the need to specify a particular way of extracting features.
- **Transformer –** Transformers are tasked with translating a sentence from one language to another, similar to what Google Translate does when converting from, say, English to Hindi.
- A transformer is a two-part neural network.
- The first part is an 'encoder' that ingests the input sentence in the source language (e.g. English); the second is a 'decoder' that generates the translated sentence in the target language (Hindi).
- The encoder converts each word in the source sentence to an abstract numerical form that captures the meaning of the word within the context of the sentence, and stores it in a memory bank.
- Just like a person would write or speak, the decoder generates one word at a time referring to what has been generated so far and by looking back at the memory bank to find the appropriate word.
- Both these processes use a mechanism called 'attention'.
- A key improvement over previous methods is the ability of a transformer to translate long sentences or paragraphs correctly.
- The adoption of transformers subsequently exploded.
- The capital 'T' in ChatGPT, for example, stands for 'transformer'.

Reference

1. The Hindu | What is a transformer, the ML model that powers ChatGPT?

Eretmoptera murphyi (Midge)

Antarctica's Signy Island, half of which is always covered in ice, has been dealing with an unwelcome guest, a flightless midge, for years.

- Eretmoptera murphyi feasts on dead organic matter and has led to faster plant decomposition.
- It leads to increasing the soil nitrate levels by three-five times compared to places on the island where the midge is absent and only native invertebrate species live.
- Midge is not new to the island, it is a native of South Georgia, a sub-Antarctic island, and was accidentally introduced to Signy in the 1960s during a botany experiment.
- The fear is that it can spread through other islands as it can survive in water.
- The invasion has made it clear that the harsh living conditions such as very low temperatures, moisture and nutrient availability, is no longer impenetrable.

Reference

1. Down to Earth | Invasion of a tiny insect is altering Antarctica's soil & its ecosystem

Submarine Volcano

In a recent discovery, scientists have reported finding 19,325 new seamounts created by volcanic activities.

- From Hawaii to Indonesia to Iceland, hundreds of islands across the globe have been formed by submarine volcanoes.
- Submarine volcanoes are exactly what they sound like volcanoes located beneath the ocean's surface.
- Because they erupt into water instead of air, submarine volcanoes behave quite differently than terrestrial volcanoes.
- For instance, it's uncommon for submarine volcanoes to have explosive eruptions.
- The sheer weight of the water above them creates very high pressure, usually resulting in what are known as passive lava flows along the seafloor.
- Eruptions and lava flow from submarine volcanoes allow volcanic islands to grow and develop thriving ecosystems.
- Most submarine eruptions do not disturb the ocean surface.

References

1. The Hindu | Submarine volcanoes
2. National Geographic | Geology of the Deep

Flash Droughts

There has been an increased occurrence of flash droughts across the globe.

- Droughts are periods of continuous water deficit, often caused by a lack of precipitation in a given area.
- They have a significant adverse impact on the regional environment and economy.
- A flash drought is a rapid onset or intensification of drought.
- Low rates of precipitation, along with abnormally high temperatures, winds, and solar radiation are factors that can rapidly alter local climate, leading to flash drought.
- It can also be linked to climatic patterns like La Niña.
- According to scientists, an early warning sign of flash droughts is evapotranspiration, which leads to a decrease in soil moisture.
- Evapotranspiration is the process of water transfer from land to atmosphere by evaporation from soil and transpiration from plants.
- Flash droughts may lead to irreversible changes in terrestrial ecosystems. In such conditions, ecosystems may not have enough time to adapt to a large water deficit and extreme heat, leading to lower productivity.
- Flash droughts can also significantly challenge drought monitoring and prediction.

References

1. The Hindu |Flash Droughts
2. The Indian Express |Link between flash droughts and climate change



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