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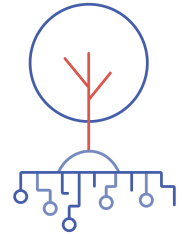
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Europe

UNDERSTANDING ARTIFICIAL INTELLIGENCE

AI Foundation Models – Explained

This explainer on AI foundation models is part of CCIA Europe's 'Understanding AI' series, which aims to inform EU policymakers and the wider public about important concepts related to artificial intelligence (AI) and the EU regulatory framework.

What are foundation models?

'AI foundation models' are defined as "**models trained on broad data [...] that can be adapted to a wide range of downstream tasks**". They generally use self-supervision at scale, which means these models can learn and label the data themselves during training.

While foundation models are sometimes assumed to be the exactly same thing as 'general-purpose artificial intelligence' (GPAI), they in fact **are only one (although very powerful) out of many types of GPAI**. Other GPAI types include – often very basic – AI systems used for a range of tasks including pattern detection or translation for instance.

Generative AI systems on the other hand (not to be confused with GPAI), are a specific subtype of foundation models. These systems are typically used to **create new content – such as text, audio, video, and computer code – from scratch**.

How can foundation models be used?

Foundation models enable numerous downstream applications. They are not a user-facing service or application as such, but rather the **underlying AI engine that powers all kinds of different applications** behind the scenes.

While the number of use cases is virtually unlimited, useful applications which demonstrate AI's vast potential for the European economy and society at large include:

- **Text generation**: understanding and generating human-like text, which can be used for various natural language processing tasks. Think, for example, of language translation, content creation, chatbots, customer support, and more.

- **Accessibility and inclusivity**: aiding individuals with disabilities by converting speech into text, or the other way around. The European Commission recently launched a pilot project to use such models to instantaneously translate its press releases in the EU's 24 languages for example.

- **Innovation and creativity**: generating creative outputs, such as images, music, and stories, thereby inspiring new ideas and fuelling innovation across industries.

- **Education**: providing personalised learning experiences to students. For example by explaining concepts and offering educational content tailored to individual needs.

- **Data analysis**: rapidly analysing large volumes of data, and identifying trends and patterns. Bloomberg developed its own foundation model, BloombergGPT, which is trained on financial data to perform tasks, including financial data analysis.

- **Research**: assisting researchers by generating hypotheses or summarising scientific papers, which could accelerate the pace of scientific discoveries.

- **Automation and productivity**: using AI personal assistants to perform routine tasks that improve productivity, such as scheduling appointments or creating to-do lists.

- **Content moderation and safety**: identifying and filtering out harmful or inappropriate content online, contributing to a safer online environment for users.

According to McKinsey, generative AI alone could enable productivity growth of 0.1 to 0.6% per year between now and 2040, adding **trillions of euros in value to Europe's economy**.

Prominent examples

- OpenAI's GPT-3.5 and GPT-4 models, which power many downstream applications such as its own language-based ChatGPT chatbot and DALL-E text-to-image application, as well as Spotify's AI DJ, and Microsoft's Bing search engine.

- Google's PaLM2 foundation model powers the Bard chatbot, as well as generative AI features like email summarisation in Gmail.

- Meta's Llama2 language model can be used for multiple purposes and is available for free for research and commercial use by downstream developers. Meta's latest SeamlessM4T model can perform translations for up to 100 languages.

- Amazon's Titan foundation models can be used for multiple tasks, ranging from summarising and generating text to identifying and filtering inappropriate or harmful content.

What are the implications for AI policy?

The rapid deployment and adoption of new cutting-edge tools has sparked intense debate among industry, academia and policymakers. Most agree AI poses certain risks and challenges that need to be effectively tackled, including societal risks such as bias and discrimination, as well as risks to safety, cybersecurity, and privacy.

In May 2023, G7 leaders committed to advancing international discussions on inclusive AI governance and interoperability. Leading companies such as Amazon, OpenAI, Google and Meta have also developed internal policies and voluntarily committed to promoting the safe, secure, and transparent development and use of AI technology.

In Europe, policymakers are in final negotiations on the **EU AI Act, the world's first comprehensive set of AI rules**. But late in the debate, EU co-legislators moved to include a

number of very stringent rules that would apply to general-purpose AI systems, as well as foundation models.

Irrespective of the risk models present or how they are used, Parliament's additions would impose significant additional obligations on developers of foundation models, over and above the already strict requirements of the AI Act. This has sparked serious concerns in the tech industry and among AI developers in particular.

In a recent paper entitled 'Regulating ChatGPT and other Large Generative AI models', the authors argue that the **current EU approach should focus more on high-risk uses of foundation models** than the technology itself, which will continue to develop over time.

An open letter signed by **more than 150 business executives also raised serious concerns about the current state of the negotiations**, warning the AI Act in its current form risks hampering EU innovation.

What are sensible rules for foundation models?

Rules for foundation models must be **technology neutral, technically feasible, and focus on the high-risk uses** of such systems.

In particular, EU lawmakers should ensure that the AI Act:

1. Keeps the focus on high-risk uses of foundation models

2. Maintains the exemption for foundation model developers prohibiting high-risk use

3. Applies balanced, implementable rules for foundation models

4. Avoids unnecessary copyright requirements (as the existing EU Copyright Directive already covers this)

5. Streamlines the allocation of responsibilities along the value chain

6. Establishes a fair and workable implementation timeline for AI systems in scope