

Artificial Intelligence and Mobile

A.G. Andurkar

Assistant Professor

Department of Electronics & Telecommunication Engineering

College of Engineering, Pune

Email id: *ashwini_andurkar@yahoo.in*

Abstract

Artificial intelligence is the hot topic of today's world of science. It is the ability of machines to take and process unstructured data and autonomously perform tasks. Machine learning is another hot topic.

Keywords: - *Machine learning, data, Artificial intelligence.*

INTRODUCTION

Artificial intelligence is the ability for machines to take unstructured data to analyze, infer conclusions, and perform tasks autonomously.

Machine learning, or ML, is the real concept driving modern AI forward. Training models are developed to process an increasing amount of data, to learn, and to improve their ability to perform the intended task. In ML, the motto is, "the more data, the better."

For example, for the DeepMind team to train its AlphaGo model to beat the world's best human Go players, they

actually enabled the AI to train itself. That's right, AlphaGo is a self-taught grandmaster. The AI played *millions* of games against itself to learn and continually improve.

AI MOVING TO MOBILE

You may be asking yourself, "how can this much data possibly be stored and computed on my phone when I don't even have enough space for all my video files or to download an app?"

Despite the limited processing, storage, memory, and power that mobile devices offer AI applications, running machine

learning models on the mobile device itself makes sense for a number of reasons.

When data is collected on the device but then transferred to the cloud for computation only to be transferred back to the device, a number of obvious inefficiencies are introduced.

From the camera to smart assistants, AI can be found in almost every smartphone feature. By simulating human intelligence, AI enables our devices to acquire information and rules automatically and even reach conclusions and take actions independently. These capabilities enable mobile devices to offer more enriching and secure experiences. As technology continues to advance, fast and power-efficient on-device AI solutions will be key to unlock future innovations, such as virtual reality and autonomous driving, and reduce the reliance on cloud AI operations.

The device is fictitious creation. Image simulated for illustrative purposes. Machine learning is the process that enables AI to analyze complex data and anticipate future actions automatically. By categorizing data with labels through supervised learning and identifying patterns in data sets via unsupervised learning, the process gives devices the

ability to help us make decisions quicker and with greater accuracy.

With reinforcement learning methods, a process that resembles how people and animals learn through trial and error, machines and devices can expand their capabilities independently without explicit programming. Together, these processes form the foundation for all AI-enabled features and functionalities.

DEEP LEARNING

A breakthrough in AI: Thanks to deep learning, our smartphones can now analyze and recognize input data such as images and objects with incredible accuracy. This capability is enabled by Deep Neural Network (DNN), which contains more than two layers between the input and output. Similar to the way a human brain functions, DNN operates, bypassing the input through the layers of connected neurons for processing. Convolution, a linear mathematical operation, is typically employed to identify patterns in data for the image, speech, and natural language processing.

NEURAL PROCESSING UNIT

An intelligent yet efficient brain

Smart, AI-powered features and capabilities involve complex computational operations which can

exceed the capacity of traditional components.

Engineered to execute intricate computations efficiently, the Neural Processing Unit (NPU) delivers the performance required to carry out demanding AI operations, such as image recognition and smart assistants. In mobile devices, the NPU is built into the processor to support smart features and take smartphone capabilities to the next level. In addition to accelerating machine learning tasks, the component is also designed to consume reduce power consumption without sacrificing performance. Compared to GPUs and CPUs, NPUs offer more power and efficiency for AI processing.

Machine learning is the process which enables AI to analyze complex data and anticipate future actions automatically. By categorizing data with labels through supervised learning and identifying patterns in data sets via unsupervised learning, the process gives devices the ability to help us make decisions quicker and with greater accuracy.

With reinforcement learning methods, a process which resembles how people and animals learn through trial and error, machines and devices can expand their

capabilities independently without explicit programming. Together, these processes form the foundation for all AI-enabled features and functionalities.

By performing tasks and answering questions, smart assistants are making our everyday life simpler and more convenient.

The technology is made possible by processing language and speech patterns through AI platforms. In addition to completing tasks, AI-powered smart assistants can also learn from the data input to enhance predictions. While smart assistants are typically cloud-based programs, on-device AI solutions can offer the necessary performance to power speech recognition algorithms. As natural language processing continues to advance, virtual assistants will also become more powerful.

CASE STUDY OF SAMSUNG MOBILE

With the addition of neural processing unit integration, the Exynos series delivers unmatched performance for mobile AI operations. The newly introduced Exynos 990 processor, featuring a dual-core neural processing unit (NPU) and improved digital signal processor (DSP), makes on-

device AI practical through faster AI processing capabilities up to approx fifteen trillion operations per second (TOPS).¹ By developing algorithms that are four times lighter and eight times faster than existing solutions, Samsung Exynos will continuously set a new standard for AI processing to push the boundaries of the next-generation mobile experience.

1) Based on Samsung's Internal Test Results

AI in action: Photography

Next-level
smart camera

With enhanced visual detection capability, AI-powered camera enables smartphones to offer more enriching photography experiences, empowering users to capture their vision.

Face detection capability allows devices to optimize white balance, exposure, and more for portrait photography, enhancing the realism and richness of skin tones in all lighting conditions. When photographing peoples in landscapes, the semantic segmentation process automatically distinguishes different elements within the frame and enables the smartphone to provide the best settings for each component to produce vivid and life-like images.

Equipped with best-in-class AI solutions, Samsung Exynos processors enable users to enjoy the next-generation mobile experiences. Launched in 2018, Exynos 9810 was the first processor in the series with deep learning software.

1) Based on Samsung's internal test results

Processors: Exynos 990, Octa-core with Custom CPU

- Mali™-G77 MP11 GPU
- Up to 108Mp Camera
- 8K 30fps Video
- WQUXGA Display
- 7nm EUV Process

CONCLUSIONS

Smart, AI-powered features and capabilities involve complex computational operations that can exceed the capacity of traditional components. Today, we have more computing power in a single smartphone than the entire NASA space program used to put a man on the moon. Moore's Law, first observed in 1965, predicted that computers would get smaller and more powerful every two years. This culminated with the smartphone. As our devices are decreasing in size and increasing in speed, we are finding that the amount of computing

speed (measured in operations per second) needed to train artificial intelligence is actually increasing at a much faster rate. Despite the limited processing, storage, memory, and power that mobile devices offer AI applications, running machine learning models on the mobile device itself makes sense for a number of reasons. When data is collected on the device but then transferred to the cloud for computation only to be transferred back to the device, a number of obvious inefficiencies are introduced. This increase in computational requirements has also increased the consumption of energy by orders of magnitude.¹ What is it about artificial intelligence that is causing this increase in the need to store and compute data?

(M.Tech, Ph.D))

In this article, we introduce artificial intelligence, how mobile AI is progressing, and how marketers can use this cutting-edge technology through examples of real-world applications. Continue reading.

REFERENCES

1. “Artificial Intelligence: A Modern Approach” by Stuart Russell and Peter Norvig.
2. “Artificial Intelligence” (Paperback, Dr. P. Ramya