Introduction of Deep learning and self-supervised learning

Before starting deep learning, we need to know the root of deep learning. Deep learning is a subnet of Machine learning which extract patterns from data using neural network.

(Neural network is a method in AI which teaches computer to process data in a way that is inspired by human brain)

What’s next, Machine learning is a branch of Artificial Intelligence (AI) which has the ability to learn without explicitly being programmed. performing machine learning can involve creating a model, which is trained on some training data and then process additional data to make predications.

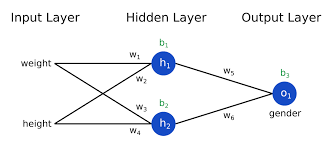
What’s more, AI is the ability of machine to perform tasks that are generally associated with human intelligence (something like mimic of human behavior).

Why do we learn deep leaning: Deep learning makes it faster and easier to interpret large amounts of data and form them into meaningful information. It is used in multiple industries, including automatic driving and medical devices.

The key idea of deep learning, instead of having a human define the features what if we could have a machine look at all of the data and actually try to extract and uncover what are the core patterns in the data so that it can use those when it sees new data to make the predictions or decisions.

In deep learning, a single neuron is called a perceptron which is the structural building block of deep learning.

Applying neural networks: lets look the example which detects gender whether male of female according to height and weight->



Non-linearity procedure is a propagation method of neural network.

Self-Supervised Learning

In the self-supervised learning paradigm, a model learns from unlabeled data by producing its own supervision signal rather than depending on human annotated labels, which is a machine learning paradigm. In conventional supervised learning, models are developed using a dataset in which every data point has a predetermined label or target. Self-supervised learning, on the other hand, seeks to train models on tasks where the labels are automatically produced from the data itself.

There are few steps of self-supervised learning for typical workflow such as data processing, creating pseudo labels, model training and fine tuning.

SSL has gained attention as a promising path to advance machine learning, often referred to as the "dark matter of intelligence. Sometimes compared to cooking, training SSL methods is considered a delicate art with a high barrier to entry.

In the field of natural language processing (NLP), self-supervised learning has been applied in various ways. Examples include word embeddings like word2vec, language models like GPT, and masked language models like BERT. Challenges within SSL include demoting bias, capturing factual knowledge, learning symbolic reasoning, and more.

The benefits of self-supervised learning include converting an unsupervised learning problem into a supervised one by training the model to predict one part of the data using another part. This method allows for the development of unsupervised learning systems using unstructured and unlabeled data at a lower cost.

The Examples of Self-Supervised Learning

