Subject: Artificial Intelligence (AI)

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EXERCISES (WEEK 1)

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1. There are different interpretations of artificial intelligence in different contexts. Please elaborate on the artificial intelligence in your eyes.

Answer:

In my opinion, artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems.

2. Artificial intelligence, machine learning and deep learning are three concepts often mentioned together. What is the relationship between them? What are the similarities and differences between the three terms?

Answer:

**Machine learning: (ML)**

ML is a discipline of computer science that uses computer algorithms and analytics to build predictive models that can solve business problems. As per McKinsey & Co., machine learning is based on algorithms that can learn from data without relying on rules-based programming. Tom Mitchell’s book on machine learning says “A computer program is said to learn from experience E with respect to some class of tasks T and performance measure P, if its performance at tasks in T, as measured by P, improves with experience E.”

ML accesses vast amounts of data (both structured and unstructured) and learns from it to predict the future. It learns from the data by using multiple algorithms and techniques. Below is a diagram that shows how a machine learns from data.



There are 3 types of ML:

+ Supervised Learning

+ Unsupervised Learning

+ Reinforcement Learning

ML applications:

+ Sales forecasting for different products

+ Fraud analysis in banking

+ Product recommendations

+ Stock price prediction

**Deep Learning: (DL)**

DL is a subset of machine learning that deals with algorithms inspired by the structure and function of the human brain. Deep learning algorithms can work with an enormous amount of both structured and unstructured data. Deep learning’s core concept lies in artificial neural networks, which enable machines to make decisions.

The major difference between deep learning vs machine learning is the way data is presented to the machine. Machine learning algorithms usually require structured data, whereas deep learning networks work on multiple layers of artificial neural networks.

How does DL work:

+ Calculate the weighted sums.

+ The calculated sum of weights is passed as input to the activation function.

+ The activation function takes the “weighted sum of input” as the input to the function, adds a bias, and decides whether the neuron should be fired or not.

+ The output layer gives the predicted output.

+ The model output is compared with the actual output. After training the neural network, the model uses the backpropagation method to improve the performance of the network. The cost function helps to reduce the error rate.

DL applications:

+ Cancer tumor detection

+ Captionbot for captioning an image

+ Music generation

+ Image coloring

+ Object detection

3. After reading the artificial intelligence application scenarios in this chapter, please describe in detail a field of AI application and its scenarios in real life based on your own life experience.

Answer:

+ Personalized Shopping

Artificial Intelligence technology is used to create recommendation engines through which you can engage better with your customers. These recommendations are made in accordance with their browsing history, preference, and interests. It helps in improving your relationship with your customers and their loyalty towards your brand.

+ AI-Powered Assistants

Virtual shopping assistants and chatbots help improve the user experience while shopping online. Natural Language Processing is used to make the conversation sound as human and personal as possible. Moreover, these assistants can have real-time engagement with your customers.

+ Voice Assistants

Without even the direct involvement of the lecturer or the teacher, a student can access extra learning material or assistance through Voice Assistants. Through this, printing costs of temporary handbooks and also provide answers to very common questions easily.

4. Which chip is for deep neural networks and Ascend AI processors. Please brief these four major modules.

Answer:

+ IC Vendors: Intel, Qualcomm, Nvidia, Samsung, AMD,…

+ ADAS chip S32V234: Vision Processor for Front and Surround View Camera, Machine Learning and Sensor Fusion Applications.

+ MediaTek: MediaTek Unveils Its Edge AI Platform & AI Technology For Cross Platform Consumer Devices.

+ Rockchip: Rockchip Released Its First AI Processor RK3399Pro — NPU Performance up to 2.4TOPs

5. Based on your current knowledge and understanding, please elaborate on the development trends of artificial intelligence in the future in your view.

+ Artificial Intelligence and health:

The COVID-19 outbreak has attracted widespread attention in the medical industry. It’s worth mentioning that the increasingly mature AI has played a great role in the fight against the pandemic. Telemedicine, intelligent imaging, medical robots, and pathology-assisted diagnosis have assisted clinicians this epidemic. In the control and prevention stage of COVID-19, machine learning algorithms that can identify the “asymptomatic infections” and “super spreaders” of the population who are most likely to be COVID-19 patients.

+ Artificial intelligence and environmental protection:

AI can replace manual environmental protection work where these operations have low efficiency, high costs, and high risks associated. Furthermore, AI technology and products can assist people in the prevention of environmental pollution and destruction, for example tracking deforestation with machine learning algorithms.

+ Artificial intelligence and 5G wireless communications:

The commercialization of 5G has ushered an unprecedented huge network scale, complex network structure, and surge of network traffic of 5G. The use of AI can enable the network to achieve high efficiency of operation and maintenance, predictability of traffic, and precision of marketing, helping communication network operations face challenges related to traditional operation and maintenance management methods.