Introduction to Artificial Intelligence

Madiba Hudson-Quansah

Contents

1. Invention that drives the industrial revolution

2. The pillars that are driving the 4th industrial revolution

3. The ecosystem that is supporting AI.

4. The current AI tech and the future of AI

1. The steam engine. The steam engine showed the potential mechanization had to improve production and everyday life.

2.
   - IOT (Internet of Things) - Computers, Internet

   - Big Data Analytics - Data, Computers

   - Cloud Computing - To increase processing power and storage available to process large amounts of data

   - AI - AI models are trained on large amounts of data and require large amounts of processing power to train.

   - Cybersecurity - To protect the data and the systems that are processing the data.

   - Augmented Reality / Virtual Reality

   - 3D Printing

   - Nano Technology

Chapter 1

Introduction to AI

1.1 Big Data

> **Definition 1.1.1: Big Data**
>
> - Volume - The amount of data that is being generated.
> - Velocity - The speed at which the data is being generated.
> - Variability - The diversity if data being generated over time.
> - Volatility - The rate at which the data is changing / How unpredictable the data is.
> - Variety - The different types of data that is being generated.
> - Veracity - Reliability of the data.
> - Value - Importance of the data.
> - Visualization - How the data is being presented / displayed

1.1.1 Challenges of Big Data

- Storage - ROM

- Memory - RAM

- Compute power - CPU, TPU, GPU

1.2 Decision Making Process

- Descriptive Analytics - What happened? Looking at historical data to understand what happened.

- Diagnostic Analytics - Why did it happen? Looking at historical data to understand why something happened.

- Discovery Analytics - What can we learn from the data? Looking at historical data to discover new insights.

- Predictive Analytics - What is likely to happen, When will it happen, Why will it happen? Using historical data to predict future events.

- Prescriptive Analytics - What should we do based on what is likely to happen? Using predictions to recommend actions.

1.2.1 Descriptive Analytics

1. Statistical Exploratory Data Analysis (EDA).

1.2.2 Diagnostic Analytics

1. Data Mining.

1.2.3 Discovery Analytics

1. Identifying previously unknown trends and patterns.

2. Adapting to identified trends and patterns for profit.

1.2.4 Predictive Analytics

1. Machine Learning

2. Deep Learning

3. Machine Modelling

1.2.5 Prescriptive Analytics

1. Simulation

2. Variable Analysis

1.3 What is AI?

> **Definition 1.3.1: Artificial Intelligence**
>
> Technology that simulates human intelligence.

> **Definition 1.3.2: General Programming**
>
> - Input
> - Process
> - Output
>
> In general programming the machine is given a set of precise instructions to follow, by a programmer.

> **Definition 1.3.3: Machine Learning Model**
>
> - Input
> - Output
> - Process
>
> In machine learning the machine is given a set of data and is trained to learn from the data. The machine then uses the data to process new data different from the training data..

1.3.1 Data Science vs AI vs Machine Learning

Data science deals with the extraction of knowledge from data, while AI is the simulation of human intelligence, and Machine Learning is the vehicle AI uses to mimic human intelligence, giving it the ability to learn and improve from new data.

- Data science is based on strict analytical evidence, while AI imparts human-like intelligence to machines.

- Deals with structured and instructed data, while AI deals with logic and decision trees

- Included various data operations while AI includes machine learning.

1.4 AI Environment

1.4.1 AI Community

- AI Innovators

- Standardisation Organization
- AI Developers
- AI Distributors
- Policy Makers
- Service Providers
- Researchers
- AI Manufacturers
- Consumers

1.4.1.0.1 AI Innovators

- Develop new AI technologies
- Develop new AI applications
- Develop new AI algorithms
- Develop new AI models

1.4.1.0.2 AI Developers

Implement software that uses AI technologies.

1.4.1.0.3 Researchers

Improve AI technologies.

1.4.1.0.4 AI Manufacturers

Companies that produce AI hardware.

1.4.1.0.5 AI Distributors

Companies that distribute software that uses AI technologies.

1.4.1.0.6 Service Providers

Companies that provide services to host AI technologies.

1.4.1.0.7 Data centre vs HPC
Data centre - Data storage and application deployment HPC (High Performance Computing) - Computing power.