AI Data

Take Home Exercise Review

Use a chatbot to help code a simple calculator. Try adding more features and make it user friendly with multiple revisional prompts.

AI Training Data

- **When training an AI model, the data is broken down into tokens (numerical representations).**
- **AI can train on any type of data; not only text.**
  - **Image, Audio, etc.**

Natural Language

- **What is natural language?**
  - **Natural language is any language that occurs ordinarily in a human community. (English, Music, Body, etc.)**
- **Natural language processing (NLP) studies how computers and humans interact in natural languages.**
  - **Summarization**
  - **Translation**
  - **Sentiment analysis**
- **The goal is to create models that allow computers to interpret, generate, and manipulate human languages.**

Turing Test

- **A method for determining whether or not a computer is capable of thinking like a human being.**
- **An evaluator has a text conversation with a human and with the AI**
  - If the evaluator can't reliably tell the machine from the computer, then the AI has passed.
- **In 2014, Google's "Eugene Goostman" was the first chatbot to pass.**

NLP tasks

- **Sentiment analysis**
  - Classifying the emotional intent of text.
  - This can be used to implement safety features.
    - "I really like the new design of your website!" → Positive
- **Part of speech tagging**
  - Determining the part of speech of a particular word based on its use and context.
    - The(DT) quick(JJ) brown(JJ) fox(NN) jumps(VBZ) over(IN) the(DT) lazy(JJ) dog(NN).
    - DT = determiner, JJ = adjective, NN = noun, VBZ = verb, IN = preposition
- **Name entity recognition**
  - Extracting entities in text into predefined categories like names, organizations, locations, etc.
    - Mark Zuckerberg(Person) is one of the founders of Facebook(Company), a company from the United States(Location).

NLP tasks

- **Summarization**
  - Shortening text to highlight the most relevant information.
    - Book summary - Sparknotes
- **Word sense disambiguation**
  - Selecting the meaning of the word with multiple meanings through a process of semantic analysis.
    - "He always wanted to be a Bollywood star." The word 'star' can be described as "A famous and good singer, performer, sports player, actor, personality, etc."
    - "The Milky Way galaxy contains between 200 and 400 billion stars". In this, the word star means "a big ball of burning gas in space that we view as a point of light in the night sky."
- **Machine translation**
  - Automates translation between two languages. Google Translate is a popular example.
    - Artificial intelligence is fun to learn → La inteligencia artificial es divertida de aprender (English to Spanish)

Tabular processing

- **Tabular processing is a less popular style of AI modeling, but still very helpful (especially for data analysis).**
- **There are two main types of tabular processing**
  - **Tabular classification**
  - **Tabular regression.**
- **Essentially, tabular processing is having the model read a tabular dataset, build a column for new data, and generate that column's data based on each row's corresponding data.**

Tabular Classification

- **The task of classifying a target category (a group) based on a set of attributes.**
- **The three types of categorical variables**
  - **Binary (1 or 0)**
  - **Ordinal (rankings e.g. good, insufficient, etc.)**
  - **Nominal (no ranking)**
- **A couple use cases for tabular classification are fraud detection with credit card transactions, or disease diagnosis based on patient symptoms and medical history.**

Tabular Regression

- **Tabular regression is the task of predicting a numerical value given a set of attributes/features.**
- **A couple use cases for tabular regression are stock price predictions, property valuations, and sales forecasting.**

Reinforcement Learning

- A technique that optimizes an AI model for better responses.
- An agent is taking actions within an environment and the environment returns a state and a reward.
  - The reward is the objective we want to optimize
  - The state represents the current condition of the environment.
- The agent uses a policy to decide the best next action to take based on the state and reward that it received from the environment.
- This allows the model to learn how to solve complex problems better with the more experience it has.

Reinforcement Learning from Human Feedback

- **Reinforcement learning from human feedback (RLHF) is used on AI models, especially chatbots, because the environment includes a human that determines how valuable the action was.**
- **Human feedback can be used to personalize responses to specific user preferences, but also is used to optimize the responses for the average human experience with the model.**

RL Architecture

- Most models that we deal with have reinforcement learning implemented into the model architecture.
- This usually includes another neural network that will take the state of the environment and produce the reward value.
- The reward value then will be used to optimize the parameters within the main model for a better response in the future.

Exercise

- **Think about what types of human feedback features are present in algorithmic products outside of AI. (Ex. Pandora, YouTube, or Social Media)**

Take Home Exercise

- **Locate and explain the functionality of all the user feedback features in Chat GPT that could help optimize the model.**