Machine Learning

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Mission:

In this project we plan to collaborate in a team of aspiring engineers, developers, and entreoreneurs, The end goal will be to implement machine learning techniques and concepts listed below to train our bot model on databases of data. In short, typically the more data the better. One of the key factors in building a successful model is Fine tuning and ensuring quality prompt design, the more in depth the input → more quality out.

Chat GPT Description:

"Welcome to our ambitious project, where a team of aspiring engineers, developers, and entrepreneurs collaborate to leverage cutting-edge machine learning techniques. Our ultimate objective is to develop and train a bot model using vast databases of data. As the adage goes, 'the more data, the better,' and we strive to harness this principle to build a truly remarkable model.

In the pursuit of excellence, we recognize that fine-tuning the model and ensuring quality prompt design are paramount. We understand that meticulous fine-tuning, optimizing the model's parameters, and refining its architecture will unlock its true potential. By carefully sculpting the model's responses through quality prompt design, we can ensure that the outputs are both insightful and reliable.

We firmly believe in the power of collaboration, as it brings together diverse expertise and fresh perspectives. Our team is composed of talented individuals from various disciplines, united by a shared passion for pushing the boundaries of technology. Together, we will tackle the challenges that lie ahead and transform our collective vision into a tangible reality.

By embarking on this project, we aim to demonstrate our prowess in machine learning, leaving an indelible mark on the field. Join us on this exciting journey as we revolutionize the world of bots and set new standards for intelligent conversational systems.

Are you ready to redefine what's possible with machine learning? Join us and let's make an impact together!"

Techniques:

- Supervised Learning:
    - Looks at previous data (Intput) → Model (Machine) → Predictions (Output)
        - If error, compares given dataset too output and adjusts model to get closer to the dataset
- Deep Learning:
    - Neural Networks:
    - Can use labeled and unlabeled data
    - Semi supervised learning
    - Trained on some label data (Used to train the model on the task), large amounts of unlabeled data (used to generalize new examples).
    - Gen AI: uses neural networks, semisupervised
        - Generative models - can create new instances
            - Generative Image model:
                - Generates Images.
            - Generative Language mode:
                - Generates text.
    - Discriminative models - Discriminate between different types of data instances, good for predicting. **WILL MOST LIKELY USE THIS FORM OF DATA FOR PREDICTION CODE.**
- Unsupervised Learning:
    - Look at raw data and compare to look for any similarities.
- Transformers:
    - Lots of data, Unsupervised Learning
    - Input - Encoding component → Pre-Trained Model → Output

Hallucinations: Errors

- Causes:
    - Not trained on enough data
    - Model is trained on bad data
    - Not given enough context
    - Not given enough constraints

Extra Notes:

- Prompt design: Quality of the input determines the quality of the output.
- Model types:
    - Text-to-text
    - Text-to image: short text description
    - Text-to video/3-D
    - Text-to task: machine takes some sort of action based upon input.
    - Foundation Model:

        - Lots of data.
        - Designed to be fine tuned.
        - Will do a lot of tasks, have potential to revolutionize industries.
- Stable diffusion is good for generating high quality images from text description.

Good Tips:

- Library for pre trained models:
    - https://aclanthology.org/2022.emnlp-demos.42.pdf
- Tools for fine tuning models
- Tools for deploying models
- Generative AI App builder creates generative AI apps without writing any code
- PALM API with makerSuite: Use it to access api using a graphical user interface
    - Model training tool:
        - Train models on data using algorithms
    - Deployment tool:
        - Helps deploy ml models to production
        - Many options
    - Monitoring tool:
        - Monitor performance of ML models in production using dashboards (Grafana is a good one)
        - DDPM (Image) Generation
            - (Initial - Predicted noise) is the formula used for the Denoising model.
            - Input is noise → Denoising model (Initial - Predicted) → Output is an image

Google Chrome:

1. ***Introduction To large Language Models***
    a. Define Large Language Models (LLMs)
        i. Subsets of Deep Learning both LLM and Gen AI are a part of Deep Learning.
        ii. General purpose language models that can be pre trained and fine tuned for specific purposes.
        iii. LLM's are trained to solve problems like:
            1. Text Classification, Question Answering, Document summarization, Text Generation.
        iv. Use datasets to train Models in context to solve specific problems.
        v. Large means the model is trained on a lot of data.
        vi. Parameters define skill of the problem.
        vii. General purpose means can solve a large variety of problems
            1. Needs a tremendous amount of data.
        viii. LLMs are pre trained and fine tuned.

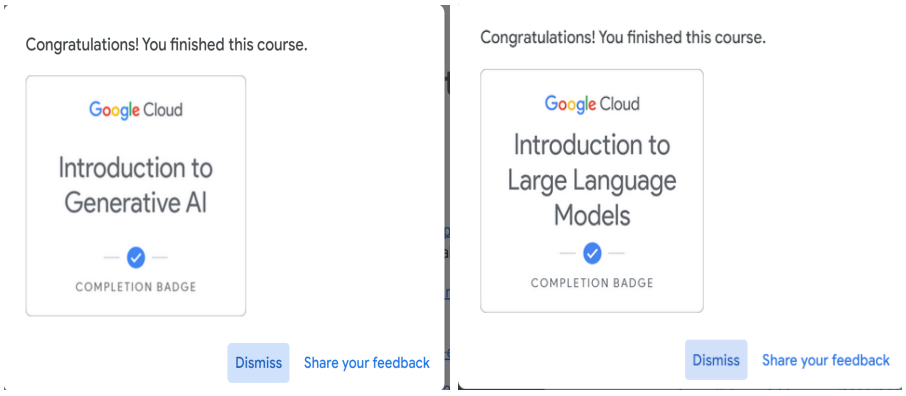
ix. Benefits:
    1. Single model can be used for different tasks.
    2. Fine tune process requires minimal field data.
    3. Performance is continuously growing with more data and parameters.
        a. PaLM - Pathways Language model
        b. 540 billion parameters.
        c. Transformer model.
            i. Encoding Component (Input).
            ii. Decoding Component (Output).
        d. Can handle many tasks at once, learn new tasks quickly.

x. LLM Development: Using pre-trained api's
    1. Think about prompt design.
    2. No ML Expertise needed.
    3. EASY

xi. Prompt Engineering:
    1. Prompt design is more general, prompt engineering is necessary for good performance.

xii. Fine tuning is expensive, Parameter efficient tuning methods are easier with parameters
    1. Generative AI Studio: https://cloud.google.com/free
        a. Build Apps without writing any code
        b. User can build with natural language
        c. PaLM API & MakerSuite use to access graphical interface, has lots of tools.

Certificate Screenshots:



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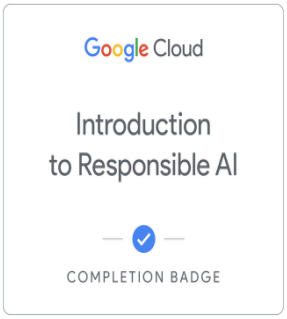

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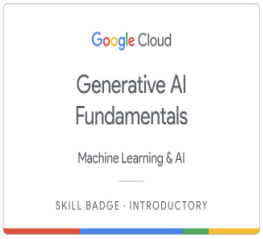

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