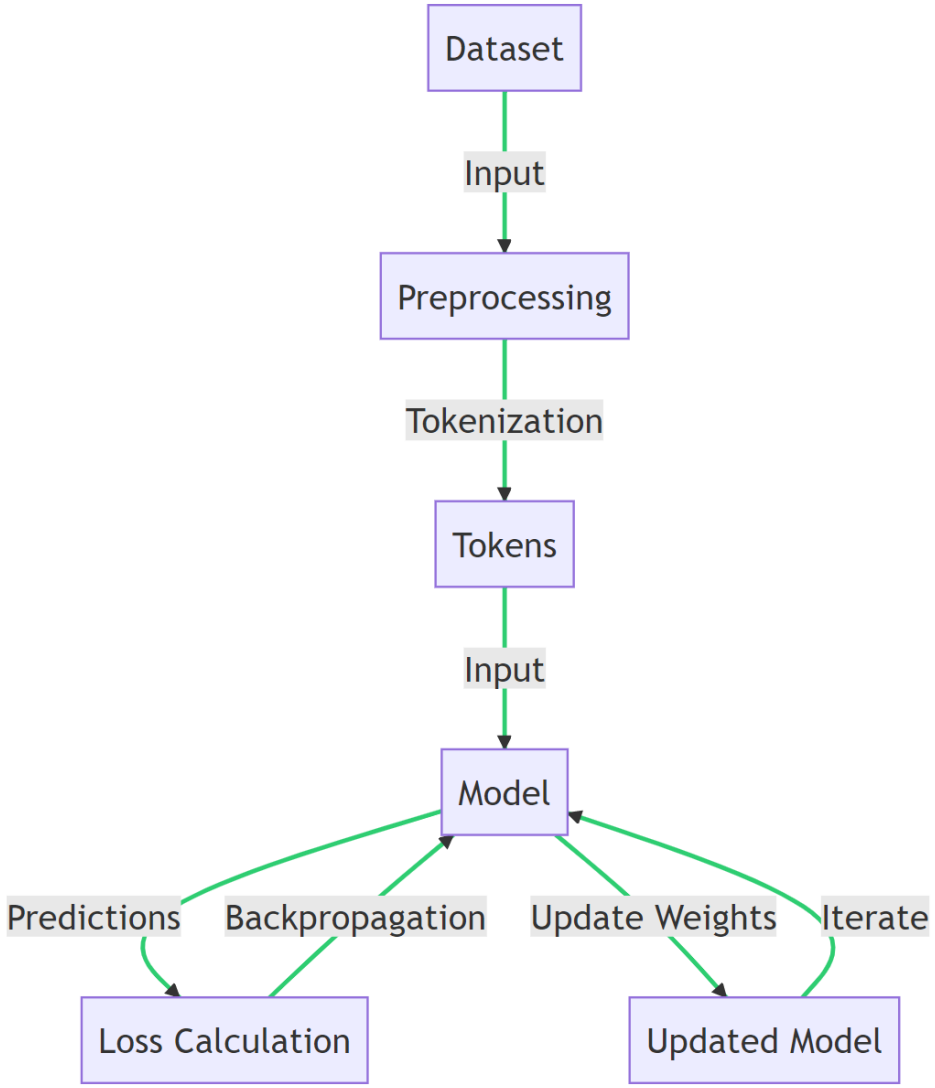
LLMs in Asset management

LLM in a nutshell



For simplicity, let's say our dataset is the sentence "The cat sat on the mat."

1. **Dataset**: Our dataset is the sentence "The cat sat on the mat."
2. **Preprocessing**: In this case, our data is already quite clean, so we might just convert everything to lowercase.
3. **Tokenization**: We break the sentence down into tokens. In this case, our tokens are the individual words: "the", "cat", "sat", "on", "the", "mat".
4. **Model**: We input our tokens into the model. The model, which has been initialized with random weights, makes predictions about what word comes next given a word or sequence of words. For example, given the input "the cat", it might predict "runs".
5. **Loss Calculation**: We compare the model's predictions to the actual next words in our dataset. In our example, the model predicted "runs" but the actual next word was "sat". This discrepancy is quantified in the loss.
6. **Backpropagation**: The model uses the loss to adjust its internal parameters. In this case, it will adjust them in a way that makes it more likely to predict "sat" after "the cat" in the future.
7. **Updated Model**: The model's weights have been updated based on the results of backpropagation.
8. **Iterate**: We repeat this process many times. With each iteration, the model should get better and better at predicting the next word in a sentence.

Fine tuning a LLM / Prompt engineering

Instruction tuned:

- Predict a response to a given instruction
- This is useful for
  - Summarisation
  - Simplification
  - Classification (sentiment analysis)

Dialog tuned:

- Predict the next response based on previous conversation
- This is used to create a
  - Chatbot
  - Debate bot
  - Rephrasing

Some use cases in finance

- **Sentiment analysis**: LLMs can process vast amounts of textual data from numerous sources such as news articles, social media posts, blogs, and more. They can then gauge the sentiment from this data, providing insights into public and market opinions about different assets.
    - **Practical application**: For instance, if there's a sudden negative sentiment surge about a company due to a recent event, portfolio managers can take this into consideration when making decisions about assets related to that company

- **Predictive analysis**: LLMs can be trained to understand and analyze financial reports, news articles, earnings call transcripts, and even macroeconomic data. By identifying patterns and relationships in this data, LLMs can help generate predictions about future stock price movements or market trends.
    - **Practical application**: For example, an LLM could analyze a company's past earnings reports and predict how its future earnings might impact its stock price

- **Risk management:** LLMs can process and analyze a wide range of data sources to identify potential risks. This can include geopolitical news, changes in regulatory environments, and shifts in market sentiment. The model can then alert portfolio managers to these risks, allowing them to take appropriate actions to mitigate potential losses.
    - **Practical application**: For instance, an LLM could analyze news and social media posts to detect early signs of a potential regulatory shift that might impact a specific sector.

Bloomberg GPT

- This is **not** fine tuned but rather trained from scratch with ~50B parameters and ~700B tokens
- Trained on 50% proprietary financial data and 50% open source data (which any other LLM is trained on).
- Use cases-
  - Sentiment analysis
  - Headline classification
  - Entity recognition

Task	Template/Example
Discriminative	
Sentiment Analysis	{sentence} Question: what is the sentiment? Answer: {negative/neutral/positive}
Aspect Sentiment Analysis	{sentence} Question: what is the sentiment on {target}? Answer: {negative/neutral/positive}
Binary Classification	{sentence} Question: {question}? Answer: {Yes/No}
Generative	
NER	Steve Jobs is the CEO of Apple Extract named entity: Steve Jobs (person), Apple (organization)
NER+NED	AAPL stopped using Intel Chips Extract ticker: AAPL, INTC
QA	{context} Question: {question}? Answer: {answer}

ChatGPT and its plugins

- Demonstration on ChatGPT using financial plugins:
  - How earning calls can be summarised in few points
  - Future outlook of a ticker based on publicly available transcripts

More resources:

- Bloomberg GPT: https://arxiv.org/pdf/2303.17564.pdf
- Personal investing using AI platform: https://magnifi.com/magnifi-personal
- Understanding LLMs: https://www.youtube.com/watch?v=zizonToFXDs
- Open source LLM repo: https://huggingface.co/
- ChatGPT and GPT4: https://arxiv.org/pdf/2304.01852.pdf
- A Simple Introduction to Natural Language Processing: This resource simplifies the complex concepts of Natural Language Processing, which is the foundation of LLMs.
- **finBERT:** https://arxiv.org/pdf/1908.10063.pdf