

Can Large Language Models Replace the Role of an Executive During an Oil & Gas Company's Earnings Call?

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Abstract

This project investigates the potential of large language models (LLMs) and LangChain in fulfilling the role of an executive during quarterly earnings calls of publicly traded oil and gas companies. We conducted an experiment in which the model was asked questions typically posed by professional analysts during such calls, having been trained on research reports and 10-K forms from companies including BP, Exxon, Chevron, and Shell.

The LLM demonstrated a significant capability to answer these questions in a manner akin to a C-suite executive. The goal of this project is to see how similarly a basic LLM can replicate the answers of executives whose job on earnings calls is to provide insight into their company's performance throughout the previous quarter.

Introduction

The rapid development of AI and machine learning has led to increasing applications of these technologies in various fields, including finance. Large Language Models, with their ability to understand and generate human-like text, have shown promise in various introductions to finance and company analysis.

Many professionals believe that the role of AI will slowly take over the bottom ranks of financial analysts at large firms, putting many jobs at risk. This study aims to investigate whether a LLM can effectively answer the questions posed by such analysts during a typical quarterly earnings call for a publicly traded oil and gas company. To determine this, we asked the LLM a series of questions surrounding interpretation of financial documents, as well as outlook into the future. We intentionally prompted queries asking to cross analyze documents as well as asking document specific questions. This helped us determine if the model is capable of assessing information from multiple sources and drawing conclusions, or if it is solely capable of analyzing one document.

```
query = "Compare Shell and Chevron long-term strategy towards a low-carbon economy?"
llm_response = qa_chain(query)
process_llm_response(llm_response)
```

Shell and Chevron both have long-term strategies to reduce their net carbon intensity, with Shell targeting a reduction of 1-4% by 2025 and Chevron targeting a reduction of 4% by 2025. Shell also has medium-term targets to reduce their NCI by 2-4% and ABf by 2-4%. Both companies also have strategies to develop lower-carbon alternatives to traditional fuels and address any remaining emissions from conventional fuels with solutions such as carbon capture and storage and nature-based solutions.

```
query = "How will companies adjust to a high-interest rate environment?"
llm_response = qa_chain(query)
process_llm_response(llm_response)
```

Companies may adjust by restructuring their debt portfolios to have more fixed-rate debt, and by using interest rate risk management mechanisms. They may also take advantage of available debt markets with historically low interest rates.

Methodology

We created a Large Language Model (LLM) and integrated LangChain, linking it to my Google Drive enabling the model to access the necessary data to be trained on. The model was trained on various PDFs of 10-K forms from BP, Exxon, Chevron, and other publicly traded oil and gas companies. Additionally, we added research reports to the training data that elaborated on the energy transition and its possible impacts on large oil companies. A significant research report implemented into the model was one analyzing OPEC (Organization of the Petroleum Exporting Countries). OPEC plays a major role in global oil & gas prices, making it a necessary feature for our model to produce forward looking statements. The second major report was one produced by Deloitte, providing insight into the ESG movement and its impacts on the energy industry. This data paired with 10-K reports analyzing the specific financials and outlooks for singular companies allowed the model to learn the many different factors that may impact an oil & gas company. Training a model on this data is similar to how a financial analyst would read over multiple sources of information before asking questions on an earnings call. Additionally, this is information that an executive would have readily available prior to the earnings call.



It is important to note that many of the answers which executives report on quarterly earnings calls are intentionally vague. The SEC restricts companies from providing sensitive information or offering explicit financial advice to the public. Additionally, companies are extremely careful to provide certain information regarding future business plans, as they may be subject to a lawsuit. Therefore, we must acknowledge that this model may produce vague responses to certain questions, not as a result of weak infrastructure, yet as a direct reflection of the data it was trained on.

After the model concluded its training, we asked it a series of questions typical of those asked during earnings calls for these various publicly traded energy companies. Questions ranged from inquiries regarding revenue growth to topics surrounding the future of oil & gas with the acceleration of ESG and high interest rates.

Results

Our findings show that the LLM was able to accurately and effectively answer many of the queries posed. The responses to high level questions generated by the LLM were consistent with the expected responses from an energy executive. The area that the model struggled with most was comparing and synthesizing information across multiple documents. However, ultra specific prompts regarding financial comparisons between Chevron and Shell eventually propelled the model to generate accurate information. The combination of company specific 10-k reports along with more general research reports into external conditions impacting the energy industry allowed the model to draw comparisons between separate companies' futures in a constantly shifting macroeconomic environment.

```
# query = "What are the differences between REALM and RAG?"
query = "Compare Shell vs Chevron's ESG efforts"
llm_response = qa_chain(query)
process_llm_response(llm_response)
```

I don't know.

```
query = "How do ESG initiatives by Shell compare to Chevron?"
llm_response = qa_chain(query)
process_llm_response(llm_response)
```

Shell has taken multiple ESG initiatives, such as investing in renewable hydrogen plants, investing in CCS, and partnering with QatarEnergy in a North Field East project. Chevron has also taken some ESG initiatives, but the specifics of their initiatives are not known.

Analysis

The model excelled with forward looking queries into the various strategies oil & gas companies are taking in a high-interest rate, ESG world. These questions are incredibly common to earnings calls, as energy conglomerates are under extreme pressure to reduce Scope 1, 2 & 3 emissions while simultaneously maximizing shareholder return.

As a simple LLM such as this was able to produce such comparable results to that of an executive, we believe that AI will eventually decimate lower end jobs within the next decade.

When asked questions regarding the improvement of a company's competitive position in the market, the model produced a response explaining the leverage of its assets and overall capabilities to reduce their carbon footprint. Although not overly specific, this response is typical to that of an executive on a public earnings call, intentionally eliminating sensitive information to the public.

Conclusion

The study provides evidence that Large Language Models can potentially aid executives in certain aspects of their role during earnings calls, particularly in the analysis of financial documents along with providing outlooks into an ESG dominated and high interest rate future. However, the model's limitation in providing nuanced and forward-looking analysis when comparing the specifics between two separate companies suggests that humans still have a significant role to play. Additionally, the skills necessary to be an elite financial analyst will likely begin to shift in this AI-driven world. Analysts will need to learn the fine points of prompt engineering in order to extract the most detailed data out of a model. LLMs will save analysts a lot of time in the future, allowing them to simply skim over hundred page documents and letting the model generate specific questions. Analysts will continue to need domain expertise in order to ensure that the model is producing accurate information. Additionally, we believe it will take many years for the SEC to allow AI to provide critical information to shareholders on earnings calls, leaving such models for back office work for the time being. An additional factor to consider are the many rules the SEC implements to financial institutions and publicly traded companies. It will be interesting to see how the SEC chooses to regulate AI and LLMs when it comes to the delivery of financial advice, and who would be responsible in a situation where inaccurate information produced by such a model leads to a lawsuit.

Recommendations

For future research, we recommend to extend the training set of the LLM to include more diverse financial documents and transcripts from earnings calls across multiple sectors. Additionally, further training of the LLM could improve its ability to handle complex financial analysis and forward looking assessments into the global market.

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