

# Integrating AI into Equity Research: A Case Study on Lululemon in the Apparel Retail Industry



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## Abstract

This study explores the development of a generative AI model, "My GPT," tailored to provide equity research for individual investors, with a specific focus on Lululemon Athletica Inc. The project's goal was to create an accessible financial analysis tool that could potentially rival traditional, costly financial services. The research involved iterative model development, beginning with a baseline model and advancing through four subsequent iterations, each refined based on the increasing complexity of prompts and the depth of training data. These iterations incorporated detailed financial reports, market trends, and industry-specific metrics to enhance the model's analytical accuracy and relevance. The final model was capable of producing a detailed equity research report, reflecting strengths in comprehensive financial understanding and industry insights but with limitations in capturing real-time market data and the subtleties of financial forecasting. The outcomes of this project demonstrate the potential of AI in democratizing financial analysis, providing individual investors with robust tools for informed financial research.

## Introduction

This research project explores the development and refinement of a generative AI, termed "My GPT," specifically designed to conduct equity research for individual investors, focusing on Lululemon Athletica Inc. The primary purpose of this initiative is to democratize financial analysis tools, enabling individual investors to access sophisticated stock research and analysis capabilities without the need for expensive resources.

The research comprised two main phases. Initially, four iterative models of My GPT were developed and assessed to determine the optimal prompting techniques and the most effective training data for financial analysis within the apparel retail sector. Each model iteration built on the insights from its predecessor, progressively incorporating more detailed prompts and a broader array of source data, including financial reports and market analysis, to enhance the model's analytical precision and depth of insight.

The culmination of this process was the development of a final model capable of generating a (close to) professional-level equity research report. This introduction lays the groundwork for a detailed examination of the methodologies employed, the evaluation of each model iteration, and the final implementation and capabilities of the sophisticated AI tool developed through this research.

## Methodology

The methodology for this research project was structured in a phased approach to develop, refine, and evaluate multiple versions of a generative AI model, each designed to perform specific tasks in equity research for individual investors. The project was segmented into distinct phases: development of training protocols, model iteration, and evaluation.

### Development of Training Protocols:

The project began with the development of detailed training protocols for each successive model. Starting with the Baseline Model, the AI was trained using general financial prompts and a basic dataset. Progressing through Models I to III, the complexity and specificity of both the training data and prompts were systematically increased. For instance, Model III incorporated targeted prompts designed to elicit detailed financial analyses and qualitative insights about Lululemon, as outlined in the "Model III Prompt" document. This evolution ensured each model version built upon the learned nuances of financial terminology and industry-specific knowledge.

### Training Data and Prompt Refinement:

Each model iteration was enriched with a progressively detailed set of training data, including real-time financial reports, historical data, equity research reports, and industry-specific news. For example, the training protocol for Model IV, as specified in the "Outline for Training Final Model," included comprehensive sources like annual and quarterly financial statements, market analysis reports, and ESG considerations. This approach was intended to equip the AI with a robust understanding of both historical and current financial landscapes.

### 3. Model Iteration and Refinement:

The iterative development process was critical to refining the AI models. Each model underwent testing and evaluation based on a series of quantitative and qualitative criteria, as detailed in the rubrics provided for Models II, III, and IV. These evaluations focused on the accuracy of the financial data generated, the depth of the industry analysis, and the professionalism of the equity research reports produced. Feedback from each evaluation phase was used to fine-tune the training prompts and data sets for subsequent models, ensuring continuous improvement in output quality.

### 4. Evaluation and Final Implementation:

The final phase involved a comprehensive evaluation of the last iteration, Model IV, using both performance metrics established in earlier phases and new criteria adapted for advanced analysis capabilities. The "Model IV Equity Research Report" exemplifies the culmination of this research, showcasing the AI's ability to synthesize complex financial data into coherent, insightful equity research tailored to individual investors. This model was assessed for its precision in financial forecasting, adherence to equity research standards, and ability to generate actionable investment insights.

## Phase I Findings

### I. Overview of the Assessment Strategy

The assessment framework for Phase I involved both quantitative and qualitative metrics designed to evaluate the performance of three progressively refined GPT models developed for equity research on Lululemon. This comprehensive assessment helped gauge the models' ability to produce accurate financial information, a critical component of successful equity research.

### II. Quantitative Assessment

- Current Accounting Items:** This category tested the model's accuracy in producing six essential accounting items from Lululemon's financial statements, including balance sheet, income statement, and cash flow statement data.
- Historical Accounting Items:** Assessed the model's capability to retrieve and accurately report historical financial data.
- Current Stock Information:** Evaluated how effectively the model could generate up-to-date stock price information and related metrics, crucial for real-time financial analysis and decision-making.

### III. Qualitative Assessment

- Company-Specific Questions:** Examined the model's ability to identify and analyze recent significant events affecting Lululemon, such as earnings updates or strategic decisions. This category is crucial for an equity research assistant, as it reflects the ability to provide timely, relevant insights that directly influence investment recommendations.
- Industry-Related Questions:** Tested the model's understanding of broader industry trends and dynamics within the apparel retail sector. Assessing the model's response to these questions helps ensure it can contextualize Lululemon's performance within the industry, a vital skill for creating depth in equity research reports.
- Macroeconomic Questions:** Focused on the model's capacity to integrate and assess global economic events and trends that impact the apparel retail industry. This is essential for preparing an equity research report that anticipates future market conditions and their potential effects on the company.

### IV. Progression and Performance of Models

The Phase I analysis indicates significant improvements across the models from the baseline through Models II and III, with each iteration benefiting from refined prompting and enhanced data inputs:

- Baseline Model:** Initially set a foundational level of performance with basic financial data accuracy. It demonstrated a general capability in handling current financial data but struggled with more complex historical data and nuanced qualitative analysis.
- Model II:** Introduced more detailed prompts and a broader dataset, which improved the model's accuracy in historical data handling and its ability to provide detailed qualitative insights, though some gaps remained in the depth and precision of financial forecasting and stock-related information.
- Model III:** This model saw the integration of even more targeted data and sophisticated prompting strategies, leading to high accuracy in both current and historical financial data. Qualitative analyses were notably enhanced, showing a deep understanding of industry dynamics, strategic developments, and macroeconomic impacts.

### V. Application of Findings to the Final Model

The findings from the assessments in Phase I were instrumental in fine-tuning the final model. Key applications included:

- Enhanced Data Precision:** Emphasis on accurate and comprehensive data handling was crucial, as demonstrated by improvements in financial and stock information accuracy from one model iteration to the next.
- Focused Expertise:** The final model was refined to specialize even further in the apparel retail industry, with a particular focus on Lululemon, leveraging detailed industry knowledge and current event analysis capabilities developed in earlier models.
- Advanced Prompting Techniques:** Learnings from the progressive refinement of prompts helped in designing more effective queries for the final model, ensuring that it could handle complex requests and deliver insights with high relevance and clarity.
- Integration of Real-Time Data:** Insights into the model's performance with current stock information underscored the importance of integrating real-time data feeds in the final model to ensure the accuracy and timeliness of financial analysis.

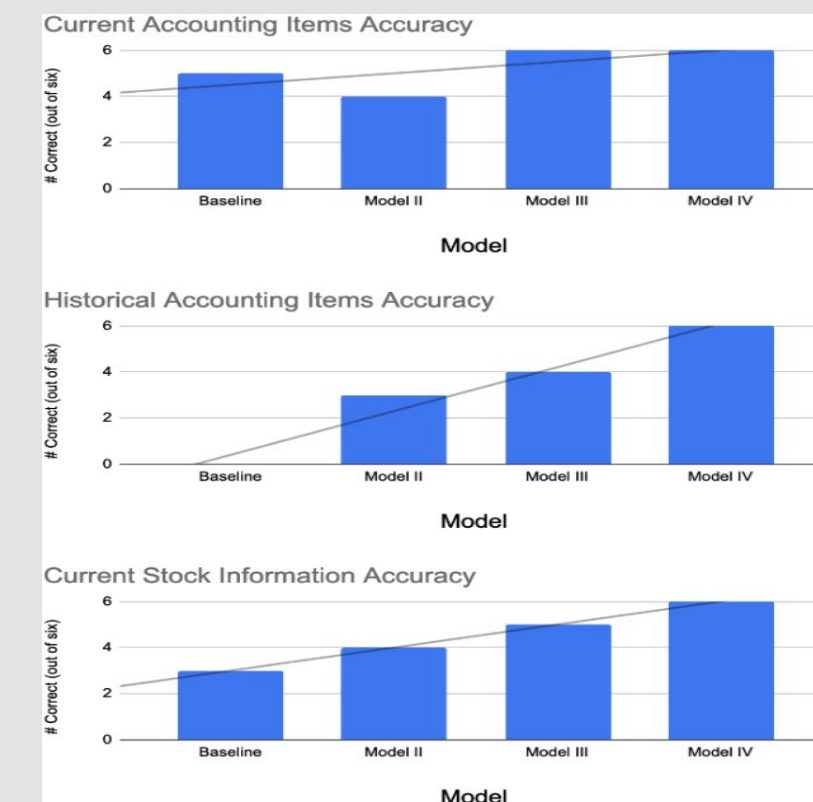
These strategic enhancements, driven by systematic evaluations and incremental improvements in data input and model prompting, ensured that the final model was well-equipped to perform robust equity research analysis, setting a new standard for AI-assisted financial analysis tools.

## VI. Phase I Quantitative Results

Table I – Qualitative Assessment Performance

Model	Current Accounting Items	Historical Accounting Items	Current Stock Information
Baseline	5/6	0/6	3/6
Model II	4/6	3/6	4/6
Model III	6/6	4/6	5/6
Model IV	6/6	6/6	6/6

Graph I - Qualitative Assessment Performance



\*Table I shows the performance for models I (Baseline) through IV. Each model was tested on the following quantitative information: Current Accounting Items - Revenue, Net Income, Assets, Liabilities, Free Cash Flow & Working Capital. Historical Accounting Items - Q3 2020 Revenue, Q1 2019 Net Income, Q3 2023 Current Assets, Q4 2021 Current Liabilities, Q3 2023 Operating Cash Flow & ROP, Q3 2022 Working Capital. Current Stock Information - Market Cap, Current Share Price, Beta, P/E, P/S, 11 Estimated Price Targets.

## Phase II Findings

### I. Introduction to Phase II Grading Scheme

Phase II of our project involved a detailed evaluation of the final model's equity research report on Lululemon using a comprehensive grading scheme. This scheme was designed to assess critical aspects of the report that are essential for high-quality equity research. Here is an explanation of what each category in the grading scheme measures and why it is crucial for evaluating an equity research paper:

### II. Final Model Assessment Criteria

- Financial Analysis and Accuracy**  
This category measures the accuracy and depth of the financial analysis presented in the report. It assesses how well the report presents Lululemon's financial data, including growth trends and profitability metrics. A strong equity research report must base its conclusions on accurate, up-to-date financial data to provide valuable insights to investors.
- Strategic and Market Insight**  
Evaluates the depth of strategic insights and market analysis within the report. This includes the identification of key market trends and a thorough understanding of Lululemon's strategic position within the competitive landscape.
- Comprehensiveness and Evidence**  
Assesses how comprehensively the report covers all relevant aspects of Lululemon, including financial performance, strategic initiatives, and potential risks. This category also evaluates the effective use of evidence to support the analysis.
- Presentation and Clarity**  
Measures the clarity of communication and the organization of the report. This includes the use of professional finance language, logical structure, and formatting of the report.
- Innovation and Originality**  
Evaluates the report's originality and the innovative nature of its analysis. This involves the introduction of unique insights and potentially new methodologies for analyzing the company.

### III. Final Model Results Breakdown

#### 1. Financial Analysis and Accuracy (1-10)

Score: 6/10

The report accurately presents Lululemon's financial data, including revenue growth and profit margins. The financial trends are clearly outlined, demonstrating the company's strong performance in recent years. However, the report lacks in-depth financial models and complex forecasts that are standard in professional equity research, leading to a score that reflects strong but not exceptional analytical depth.

#### 2. Strategic and Market Insight (1-10)

Score: 6/10

The report provides solid strategic recommendations and identifies key market trends, such as the growth of the athleisure market and Lululemon's strategic initiatives in digital expansion and international markets. However, the competitive analysis is somewhat superficial and does not deeply engage with competitor strategies or market share specifics, which are crucial for a higher rating in this category.

#### 3. Comprehensiveness and Evidence (1-10)

Score: 8/10

This report scores well on comprehensiveness, covering a broad spectrum of topics relevant to an equity analysis, including financial performance, strategic initiatives, and potential risks. It effectively uses data from Lululemon's past performance to support its conclusions. However, it could be improved with more forward looking data and insights into industry dynamics to enhance its evidence base.

#### 4. Presentation and Clarity (1-10)

Score: 9/10

The report is exceptionally well-structured and clear, making it easy to read and understand. It effectively uses headings and subheadings to organize content, and the language is professional and concise. Visual aids like graphs or tables could enhance understanding further, but overall, the presentation is nearly exemplary.

#### 5. Innovation and Originality (1-10)

Score: 6/10

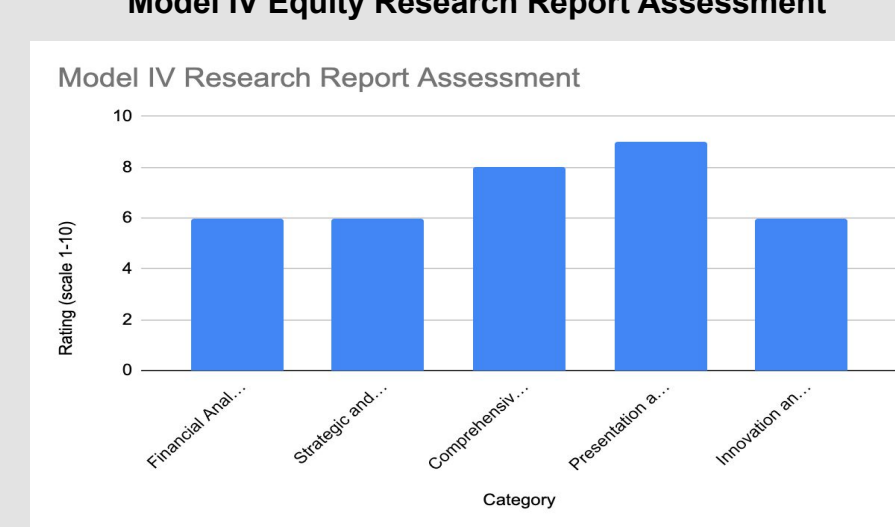
The report introduces some original insights, particularly in discussing Lululemon's strategic adaptations and market opportunities. However, it does not significantly deviate from conventional analysis or introduce novel methodologies or perspectives that would mark it as highly innovative in the field of equity research.

## IV. Phase II Assessment Results

Table II – Model IV Final Equity Research Report Assessment

Category	Rating (scale 1-10)
Financial Analysis and Accuracy	6/10
Strategic and Market Insight	6/10
Comprehensiveness and Evidence	8/10
Presentation and Clarity	9/10
Innovation and Originality	6/10

Graph II – Model IV Equity Research Report Assessment



\*Table II shows the grading breakdown for the final equity research paper produced by model IV. The grading categories are defined as follows:  
**Financial Analysis and Accuracy:** Combines the accuracy of financial data and the analytical depth. This category evaluates the correctness of financial figures and the depth of financial trend analysis, including the use of financial models and projections.  
**Strategic and Market Insight:** Merges strategic insight and market/competitive analysis. Grades the quality of strategic recommendations and the depth of understanding of Lululemon's market position, competitive landscape, and key industry trends.  
**Comprehensiveness and Evidence:** Assesses how thoroughly the report covers necessary aspects of Lululemon, including operations, market environment, risks, and opportunities, as well as the use of evidence and data to support conclusions.  
**Presentation and Clarity:** Rates the overall readability, organization, and visual presentation of the report, including the logical flow of content and the effectiveness of graphs and tables.  
**Innovation and Originality:** Evaluates the report on its originality in presentation and interpretation of data, offering innovative insights or suggesting unique strategic opportunities.

## Discussion

The integration of artificial intelligence (AI), particularly large language models (LLMs), into the finance sector is reshaping how financial analysis and investment decisions are approached. This research project provides valuable insights into the capabilities and limitations of AI in this field.

### Impact of AI and LLMs in the Investing World

- Automation of Analytical Tasks:** AI excels at automating routine data processing and analysis tasks. In our project, GPT models demonstrated their ability to aggregate and present financial data coherently. This automation extends to generating initial drafts of equity research reports, which can significantly speed up the analysis process, allowing human analysts to focus on deeper strategic insights and decision-making.
- Real-Time Data Processing:** AI's ability to process and analyze data in real-time is a significant advantage in the fast-paced investing world. This capability ensures that financial models and investment strategies can quickly adapt to changing market conditions, providing investors with a competitive edge.
- Scalability and Accessibility:** AI technologies, especially open-source models, democratize access to sophisticated financial analysis tools. Small firms and individual investors, who may not have the resources to hire large teams of analysts, can leverage AI to obtain detailed insights into market trends and company performances.

### Limitations and Room for Improvement

- Depth of Analysis:** While AI can efficiently handle large volumes of data, its ability to perform deep, nuanced analysis is still developing. As observed in the project, the models struggled with in-depth financial modeling and complex forecasts that are standard in professional equity research. This limitation highlights the need for ongoing training and refinement of AI models to handle more sophisticated analytical tasks.
- Understanding Contextual and Qualitative Information:** AI's capacity to interpret and analyze qualitative information such as market sentiment, regulatory changes, and competitive strategy in context remains limited. This project revealed that while the models could identify and report on strategic initiatives and market trends, their analysis lacked the depth and context that seasoned financial analysts provide.
- Ethical and Regulatory Concerns:** The increasing use of AI in finance also raises ethical questions, particularly concerning transparency, data privacy, and the potential for biased outcomes. Ensuring that AI systems in finance operate fairly and transparently is crucial, necessitating stringent regulatory standards and ethical guidelines.

The current state of AI in finance is marked by significant advancements and potential, with areas ripe for further development. As AI technologies continue to evolve, they are expected to play an increasingly transformative role in the finance sector. However, achieving this potential will require addressing the current limitations in analytical depth and contextual understanding, alongside navigating the ethical landscape. The findings from this project underscore the current need for a balanced approach, where AI complements human expertise.

## Conclusion

This project focused on evaluating the capability of ChatGPT-4 (My-GPT) models to generate equity research reports, with a specific focus on Lululemon within the apparel retail sector. By adopting a structured approach over multiple phases, we developed and enhanced the models' abilities to process and analyze complex financial data accurately and provide insightful market analysis.

The progression began with a baseline model and evolved through two additional phases, each incorporating more sophisticated data inputs and prompting mechanisms. This methodical enhancement helped pinpoint critical areas for improvement, which directly informed the modifications made to subsequent models. The performance of each model was assessed using a detailed grading scheme that focused on key metrics such as financial accuracy, strategic insight, comprehensiveness, presentation, and innovation.

Results from the final model indicated strengths in clarity and structure of the presented financial reports, and comprehensiveness in covering relevant topics extensively. However, it also revealed areas needing enhancement, particularly in deep financial modeling and in-depth competitive market analysis, where the model scored lower.

The exploration of GPT models in this project illustrates the growing influence of open-source AI technologies in financial analysis and investment strategy. Open-source AI platforms, such as those provided by OpenAI, offer foundational technologies that can be customized to meet specific needs within finance, providing tools that are scalable, adaptable, and cost-effective. This accessibility allows a broader range of investors and financial analysts to leverage advanced analytics.

However, the application of open-source AI in finance is not without challenges. Achieving high levels of accuracy in financial forecasts and market insights requires not only sophisticated algorithms but also extensive, domain-specific tuning and data inputs. Additionally, the ethical implications and the demand for transparency in AI-driven decisions call for stringent standards and regulatory oversight to ensure fairness and prevent misuse.

In conclusion, the potential of AI to enhance financial services is significant, promising more sophisticated analytical tools and personalized investment solutions. The success of AI integration into finance will depend on continuous improvements in AI models, enhanced collaboration between technology experts and financial professionals, and a solid framework for addressing ethical and regulatory challenges.

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