

**Agentic and Generative AI Framework for Augmented
Financial Advisory and Portfolio Intelligence**

DISSERTATION

Submitted in partial fulfillment of the requirements of the
Degree: M.Tech in Artificial Intelligence & Machine Learning

By

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(2023AA05722)

Under the supervision of

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BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI

SECOND SEMESTER 2024-25

DSECLZG628T / AIMLCZG628T DISSERTATION

Dissertation Title : Agentic and Generative AI Framework for Augmented Financial Advisory and Portfolio Intelligence

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Courses Relevant for the Project & Corresponding Semester : 1. NLP Applications (S1-24)

2. Data Management for
Machine Learning (S1-24)

3. Conversational AI (S1-24)

4. Deep Neural Networks (S2-23)

Abstract

In an increasingly complex and data-intensive investment environment, financial advisors are expected to deliver tailored, real-time, and goal-aligned recommendations to diverse client segments. Advisors must synthesize structured portfolio metrics and market data with unstructured content such as research reports, regulatory updates, product documents, and even client communications—while maintaining compliance, transparency, and personalized engagement. Traditional manual workflows are insufficient to meet these demands at scale. This research proposes a unified **Agentic AI framework**, powered by **Generative AI**, **Multimodal Intelligence**, and **Conversational Agents**, to augment the end-to-end investment advisory lifecycle—from client profiling to portfolio recommendation, ongoing analysis, and education.

At the core of the proposed solution is an **Agentic AI architecture**, where a set of collaboratives, autonomous agents emulate human-like expertise by orchestrating domain-specific tasks within the advisory workflow. Each agent is endowed with task-specialized reasoning capabilities and access to multimodal data. This approach enables the system to be flexible, modular, and adaptive to the evolving needs of both clients and advisors.

1. Agentic AI Framework for Advisor Workflows

This research introduces a multi-agent system wherein each agent autonomously handles a dedicated function in the advisory chain:

- **Client Profiling Agent** ingests historical transactions, risk tolerance indicators, life milestones, and personal preferences to build a deep client persona.
- **Portfolio Analysis Agent** interprets structured data (e.g., performance metrics, asset allocations) and unstructured insights (e.g., analyst reports, product documentation).
- **Compliance & Suitability Agent** ensures recommendations adhere to evolving regulatory standards and align with client goals and risk profiles.
- **Recommendation Agent** synthesizes investment advice by integrating domain knowledge and contextual triggers, generating explainable outputs.

These agents leverage **Multimodal AI techniques** to jointly reason over text, tabular data, time-series metrics, and external content. By integrating structured databases with unstructured documents (such as product brochures, market commentary, or corporate actions), each agent achieves a more comprehensive situational awareness. This multimodal approach improves both accuracy and interpretability.

2. Knowledge Graph + Generative AI for Wealth Advisory

The system constructs a domain-specific Financial Knowledge Graph to model relationships among financial instruments, client attributes, and investment strategies. This serves as a reasoning backbone, enabling agents to generate context-aware, coherent insights.

By combining this graph with Generative AI, the Recommendation Agent delivers personalized, transparent investment strategies. Graph-based inference paths are preserved for auditability and advisor trust.

3. Conversational AI Layer for Client-Adviser Interaction

A RAG-based Conversational AI interface enables seamless advisor-client interaction by retrieving relevant documents to ground responses.

Key capabilities include:

- **Portfolio Intelligence Chatbot** for explaining portfolio performance and decisions.
- **Client Sentiment and Goal Modeling** using LLMs to enrich profiling with emotional and preference cues.
- **GenAI Tutor** that adapts investment education to the client's financial literacy level. This layer supports engagement and feeds enriched data back into the Agentic system to enhance decision support.

This thesis explores the design of a future-state Agentic AI architecture to assist Wealth Advisors by:

- Enhancing contextual relevance in investment recommendations
- Streamlining advisor workflows through agent-driven automation
- Improving client engagement via personalized conversational agents

By integrating multimodal analysis, explainable reasoning, and conversational delivery, the research presents a transformative approach to financial advisory automation. It aims to augment human advisors with scalable, intelligent support while making investment guidance more accessible and responsive.

The scope of work is comprehensive, focusing on the conceptualization and development of an Agentic AI platform tailored for Advisor Assist in Portfolio Analysis. While the full-scale realization of such a system involves significant engineering effort, this research will aim to deliver a well-defined future-state architecture, along with a demonstrable prototype featuring a cohesive set of intelligent agents. These agents will collectively illustrate the envisioned capabilities of the platform offering a clear view of the potential impact and applicability of Agentic AI in wealth advisory.

Key Words: Agentic AI, Financial Advisory Workflow Automation, Portfolio Analysis, Generative AI, Multimodal Intelligence, Retrieval-Augmented Generation (RAG), Financial Knowledge Graph, Client Engagement Analytics, AI in WealthTech, LLMs, AI For DecisionSupport

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI

II SEMESTER 23-24

DSECLZG628T / AIMLCZG628T DISSERTATION

Dissertation Outline

BITS ID No. 2023AA05722

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Designation of Supervisor: Principal Architect

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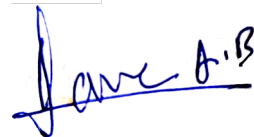
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Topic of Dissertation: Agentic and Generative AI Framework for Augmented Financial Advisory and Portfolio Intelligence



(Signature of Student)

Date: 24-May-2025



(Signature of Supervisor)

Date: 24-May-2025

Project Work Title

"Agentic AI Framework for Augmented Financial Advisory Using Generative and Multimodal Intelligence"

1. Purpose

To design a multi-agent AI framework that leverages Generative AI, Knowledge Graphs, and Conversational AI to augment human financial advisors in client profiling, portfolio analysis, investment recommendations, and personalized advisory communications.

2. Expected Outcome

- Design of a task-specific Agentic AI architecture that automates key advisor functions
- Demonstrate of improved portfolio insight generation, compliance checking, and client engagement
- Evaluation of productivity gains, accuracy improvements, and user satisfaction enhancements

3. Literature Review:

The following are referred journals from the preliminary literature review.

Flow: Modularized Agentic Workflow Automation

- **Authors:** Boye Niu et al.
- **Published:** January 2025
- **Summary:** This research focuses on modularizing agentic workflows to allow dynamic adjustments during execution. It addresses the need for real-time adaptability in complex task environments, crucial for financial advisory services.
- <https://arxiv.org/abs/2501.07834>

Benchmarking Agentic Workflow Generation

- **Authors:** Shuofei Qiao et al.
- **Published:** October 2024
- **Summary:** The paper introduces a benchmarking framework for evaluating agentic workflow generation, emphasizing the decomposition of complex problems into executable workflows, which is vital for assessing AI performance in financial tasks.
- <https://arxiv.org/abs/2410.07869>

Are Generative AI Agents Effective Personalized Financial Advisors?

- **Authors:** Takehiro Takayanagi, Kiyoshi Izumi, Javier Sanz-Cruzado, Richard McCreddie, Iadh Ounis
- **Published:** April 2025

- **Summary:** This study evaluates the effectiveness of large language model (LLM)-based agents in providing personalized financial advice. Through a user study with 64 participants, the research examines challenges in eliciting user preferences, delivering tailored investment guidance, and the impact of agent personality on trust and satisfaction. Findings indicate that while LLM-advisors can match human performance in certain areas, they may struggle with conflicting user needs and that users often prefer agents with extroverted personas, even if the advice quality is lower.
- <https://arxiv.org/abs/2504.05862>

Agentic AI Use Cases Across Financial Services

- **Publisher:** Citigroup
- **Published:** January 2025
- **Summary:** Citigroup's report highlights key use cases of agentic AI in financial services, including compliance, fraud prevention, onboarding, KYC, wealth management, credit, and treasury workflows.
- <https://www.citigroup.com/global/insights/agentic-ai>

4. Existing Process

Currently, financial advisors manually aggregate and interpret data from disparate sources such as portfolio management systems, regulatory documents, product brochures, market news, and CRM notes. Client communications are often generic or templated. Complex investment decisions depend heavily on individual expertise, which limits scalability and consistency.

5. Limitations

- High manual effort in profiling, recommendation, and analysis
- Inconsistent and delayed insights due to fragmented data sources
- Lack of personalization in client communication
- Difficulty in ensuring compliance and traceability across decisions
- Clients often struggle to grasp financial concepts due to limited financial literacy support

6. Justification for Methodology

The chosen methodology centers around an Agentic AI system, where independent agents, each handling a specific task (profiling, compliance, recommendation, etc.), simulate the reasoning process of a skilled advisor. This allows for modularity, scalability, and task specialization. The integration of Generative AI enables fluent and personalized content generation, while Knowledge Graphs ensure explainability and contextual coherence. A Conversational AI layer enhances client-advisor interaction through natural language and sentiment-aware interfaces. This hybrid design is well-suited to solve the multifaceted nature of investment advisory workflows.

7. Project Work Methodology

Where an End-to-End development of the entire platform will involve the following six phases:

1. **Requirement Analysis & Use Case Design** : Identify advisory tasks, user roles, data sources, and define agent responsibilities.
2. **Data Architecture & Knowledge Graph Construction**: Integrate structured (portfolio, CRM) and unstructured (news, PDFs) data sources and build a financial knowledge graph.
3. **Agent Development (Agentic AI Layer)**: Implement and test the functionality of individual agents: profiling, analysis, compliance, and recommendation.
4. **Generative AI Integration**: Use LLMs to enhance decision support, natural language generation for explanations, and create the GenAI Tutor for client education.
5. **Conversational AI Interface**: Build a multimodal, RAG-powered conversational agent layer for both advisors and clients, incorporating sentiment detection and goal modeling.
6. **System Integration, Evaluation & Validation**: Validate the system through performance metrics (accuracy, latency, satisfaction), case studies, and advisor feedback.

However, we will keep the scope of this engagement to the following specific actions based on the timelines available for execution

1. **Requirement Analysis & Use Case Design**: Identify advisory tasks, user roles, data sources, and define agent responsibilities.
2. **Data Architecture & Knowledge Graph Design**:
 1. Formulate and design the data architecture to Integrate structured (portfolio, CRM) and unstructured (news, PDFs) data sources
 2. Design of a financial knowledge graph.
3. **Agentic AI Architecture**: Architect and Design an Agentic AI System which can help develop the End-to-End platform for Financial Advisory platform functionality of individual agents providing profiling, analysis, compliance, and recommendation
4. **Agent Development (Agentic AI Layer)**: Develop one or two of the agents among the Client Profiling, Portfolio Analysis, and Recommendation Agents; Interface with stubbed/dummy product processors for generating analysis
5. **Design of Conversational AI Interface**: *Design a multimodal, RAG-powered conversational agent layer for both advisors and clients, incorporating sentiment detection and goal modeling¹*

¹ * Since the scope of the project is extensive, will attempt to achieve step 5 on Best Effort Basis

8. Benefits Derivable from the Work

- **Efficiency Gains:** Automates time-consuming advisory tasks with human-like accuracy
- **Scalability:** Enables advisors to support more clients with greater consistency
- **Personalization:** Delivers tailored communication and recommendations aligned to client profiles and goals
- **Compliance & Transparency:** Supports explainable AI decisions with traceable logic paths through the knowledge graph
- **Client Empowerment:** Educates clients with AI-generated, understandable content through GenAI tutoring
- **Innovation:** Paves the way for an intelligent hybrid advisory model that blends human expertise with autonomous AI agents

Broad Area of Work

Artificial Intelligence and Machine Learning in Financial Services, specifically focused on applying **Agentic AI architecture**, **Generative AI**, **Multimodal AI**, and **Knowledge Graphs** to support and enhance the workflows of human financial advisors in portfolio analysis, client engagement, regulatory compliance, and personalized communication.

1. Objectives

The objectives of this dissertation project are:

1. To **design an Agentic AI framework** where each agent simulates a core advisory task such as client profiling, portfolio evaluation, investment recommendation, and compliance assessment.
2. To design a **multimodal data pipeline** that ingests structured and unstructured financial data (portfolio data, market news, product documents, etc.).
3. To design **Knowledge Graphs** for integrating client, product, and regulatory knowledge in a unified, queryable format that supports explainable recommendations.
4. To integrate **Generative AI and LLM-based tools** for:
 - Financial content generation
 - Personalized recommendation explanation
 - Client literacy education (via a GenAI Tutor)
5. To design a **Conversational AI layer** using Retrieval-Augmented Generation (RAG), for real-time portfolio queries, goal alignment, and client sentiment interpretation.²

2. Scope of Work

The research will comprehensively cover the **design, a prototype development** of an AI-augmented advisory platform. The scope includes:

A. Data Aggregation and Modeling

- Identification of all relevant structured data (portfolio, transactions, risk scores, CRM data).
- Designing a multimodal ingestion pipeline using ETL tools.

² Since the scope of the project is extensive, will attempt to achieve step E on Best Effort Basis

B. Knowledge Graph and Semantic Layer

- Entity and relationship extraction (clients, assets, risks, goals, regulations).
- Design of a financial knowledge graph with Integration of vector search for similarity-based recommendations.

C. Agentic AI System Design

- Define functional boundaries and capabilities for each agent:
 - Client Profiling Agent
 - Portfolio Analysis Agent
 - Compliance Agent
 - Recommendation Agent
- Develop 1 or 2 agent types among the 4 agent types
- Implement inter-agent communication and orchestration logic.

D. Generative AI Integration

- Use LLMs (like GPT-4, LLaMA 2) for:
 - Narrative generation of insights
 - Explaining complex investment ideas
 - On-demand learning content via GenAI Tutor

E. Conversational Interface Development³

- Design a RAG-based Chatbot for Advisors and Clients which can Train on advisor FAQs, market content, client queries.
- Provide hooks for Integrating LLMs for Client Sentiment and Goal Modeling.

3. Detailed Plan of Work (16 Weeks)

Sl #	Phase	Duration	Key Activities	Week
1	Requirement Analysis & Literature Review	2 weeks	Identify advisor workflow tasks; Study related AI models; Review past research and frameworks from Google Scholar, arXiv, and industry reports	1-2
2	Data Collection & Knowledge Graph Design	2 weeks	Gather structured (portfolio/CRM) & unstructured data; define entities and relationships; design financial knowledge graph schema	3-4

³ ** Since the scope of the project is extensive, will attempt to achieve step E on Best Effort Basis

Sl #	Phase	Duration	Key Activities	Week
3	Agent Design & Planning	2 weeks	Define task-specific agents and their responsibilities; map agent interaction flow; Provide design and Architecture of an Agentic AI platform for Advisor Assist Platform	5-6
4	Design: Data Pipeline + Graph Engine	2 weeks	Define and design multimodal ETL pipeline; The initial knowledge graph using Neo4j; Connect data sources	7-8
5	Develop Agent Functions	4 weeks	<ul style="list-style-type: none"> Implement at least one of the agents among the Client Profiling, Portfolio Analysis, and Recommendation Agents; Interface with stubbed/dummy product processors for generating analysis Integrate with LLM's: Use prompt-engineering to finetune and structure responses to the end-users Test with sample data 	9-13
5*	<i>Finetune LLM responses</i>	1 week	<i>Fine-tune LLMs; Build modules for recommendation narration and financial education</i>	14*
6*	<i>Conversational AI Interface</i>	1 weeks	<i>Design of chatbot using RAG approach to query agents and knowledge graph; Add sentiment and goal modeling layer</i>	15*
7	Documentation & Final Presentation	1 week	Compile research report, results, and architecture documentation; Prepare thesis submission and presentation decks	16

“* Since the scope of the project is extensive, I will try to achieve these tasks on Best Effort Basis

4. Literature References:

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- **Published:** January 2025
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- <https://www.citigroup.com/global/insights/agentic-ai>

Supervisor's Rating of the Technical Quality of this Dissertation Outline

EXCELLENT / GOOD / FAIR/ POOR (Please specify): EXCELLENT

Date: 25-May-25

A handwritten signature in blue ink, appearing to read 'Avinash B. Dave', is written over a horizontal line.

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