TSI
TRANSPORT AND TELECOMMUNICATION INSTITUTE

UWE Bristol
University of the West of England

Artificial Intelligence Group Project

AI Agent for Financial Report Analysis

Team Members:

Aleksandrs Skraucis (st88679) - *Visualisation & UI Lead*

Anjali Shibu (st86860) - *Lead Application Developer*

Sandra Usāne (st89259) - *Data Processing & Evaluation Lead*

Current Challenges in Financial Report Analysis

- Manual analysis of annual reports **takes days of analyst's time**
- **High error rates** in financial spreadsheets.
- Inconsistent report formats lead to **overlooked critical details**.
- **Delayed decision-making** due to analysis capacity.
- **Resource-intensive processes** limit scalability.
- No Latvian language report analyser available.

Contemporary AI Approaches in Finance

- **Financial LLMs** -FinBERT, BloombergGPT,FinGPT

  Gap: Hallucinations and calculation errors

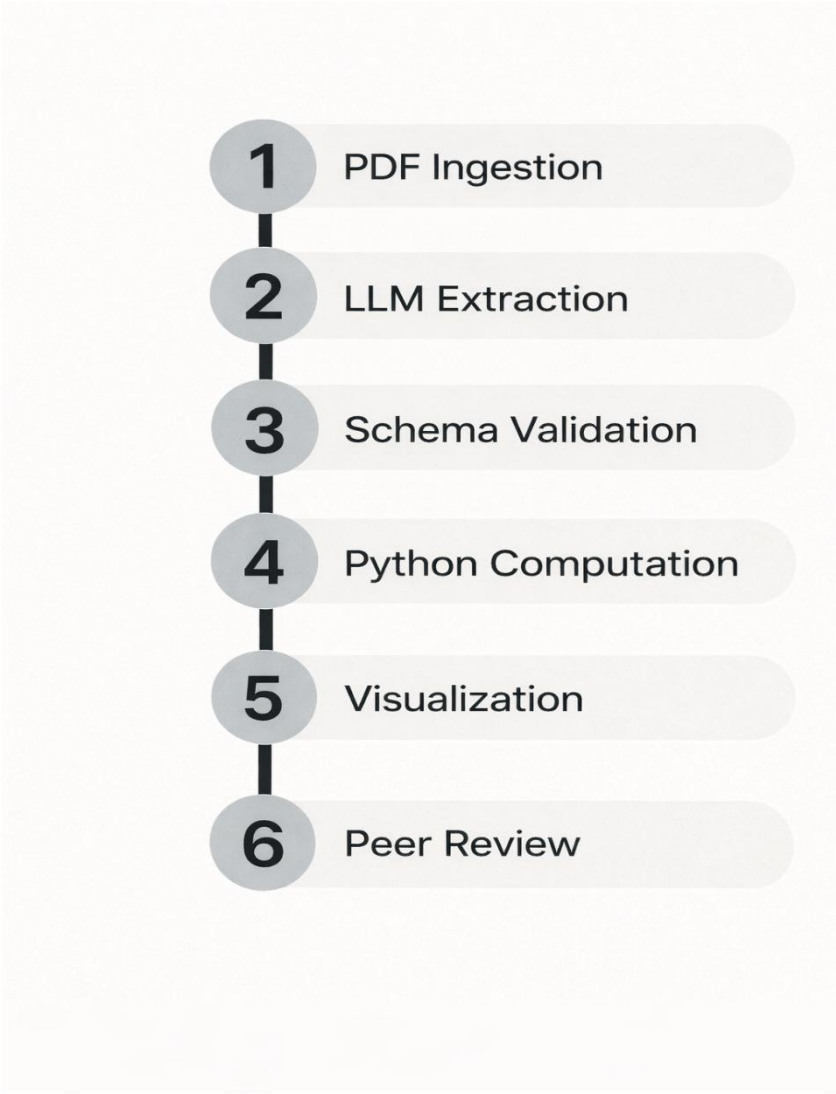
- **Hybrid approaches**:

1) RAG(Retrieval Augemented Generation)-enhances LLM by fetching real-time external knowledge.
2) PAL(Program-Aided Language)-leverage code execution to get LLMs solve complex math,logic tasks with precision.
3) Fin-RAG (Finance RAG)- retrieves real time finance data.

Our Solution

- **An AI-Powered Agent for Automated Financial Analysis** that does extraction, calculation,and comprehensive analysis of financial reports.
- Our agent combines modern Large Language Models with programmatic computation to ensure both speed and accuracy in Latvian financial analysis context.

AI Agent Pipeline



1. PyPDFLoader extracts first 8 pages (balance sheet + P&L)
2. GPT-4o / Llama-3 / Gemini extract structured data via LangChain
3. Pydantic model enforces financial data structure & consistency
4. Calculate liquidity, profitability, solvency ratios programmatically
5. Plotly generates interactive cross-company comparison charts
6. LLM generates interpretable analytical narrative in EN/LV

Agile Development Process

Anjali Shibu

Lead Developer

- Core pipeline (60%)
- LLM integration
- Gradio application
- Deployment (70%)

Sandra Usāne

Evaluation Lead

- Data validation (80%)
- Quality assurance
- Meeting notes (60%)
- Portfolio prep

Aleksandrs Skraucis

UI/Visualization Lead

- Weekly meetings (100%)
- Plotly visualizations
- UI/UX design
- Team coordination

10
Weekly Meetings

10
Risk Items Managed

10
Weeks Duration

Technical Implementation

- **Multi-LLM support-** OpenAI GPT-4.0,Groq Llama 3,Google Gemini Flash 2.5. Redundance against API limits.
- **Python Calculations** – Current ratio,Net profit margin etc. 100% Accurate math.
- **Pydantic Validation-** Structured financial schema,type enforcement,optional field handling. Prevent hallucinations.
- **Interactive UI** -Gradio interface,Streamlit,Plotly visualizations, TXT/CSV export.User-friendly access.

Key Innovation

- **Hybrid AI Architecture**

  Combining **LangChain prompt chaining** with **LLM output parsing** ensures clean, structured data flow while maintaining flexibility across providers.

- **Structured extraction + Programmatic validation = Reliable financial analysis**

Key Technical Challenges

- **LLM Hallucinations**

➢ **Solution:** Pydantic validation + Python calculations+Human verification
Owner: Anjali, Sandra

- **Inconsistent PDF Formats**

➢ **Solution:** Parse first 8 pages only + graceful error handling
Owner: Anjali

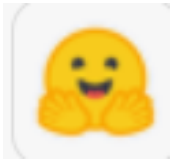
- **Raw Output Confusing**

➢ **Solution:** Structured tables + clear headers + visual UI
Owner: Aleksandrs

- **Time Constraints**

➢ **Solution:** Task allocation + 25-min meetings + time-boxing
Owner: Team

All risks mitigated through systematic planning and proactive management



Production-Ready System

Deployments : Gradio in Colab,Hugging Face Spaces , and Streamlit

https://huggingface.co/spaces/Anjali488/AI_agent_deployment

https://financialaiagent.streamlit.app/

- 4 reports tested, any one of 3 LLM API keys usable, Input Latvian Language and output in English and Latvian available.

- **GitHub Repository:** Complete portfolio with code, data, methodology artifacts, and documentation at https://github.com/sandrausane/Finance-AI-agent

Individual Growth & Learning

Anjali

✓ LangChain framework mastery

✓ Multi-LLM integration patterns

✓ Pydantic data validation

✓ Deployment architecture (HF + Streamlit)

"Learned to bridge AI capabilities with production requirements"

Sandra

✓ LLM evaluation methodologies

✓ Statistical sampling for QA

✓ Prompt engineering refinement

✓ Portfolio documentation best practices

"Developed systematic approach to AI validation and testing"

Aleksandrs

✓ User-centered AI design

✓ Data visualization strategies

✓ Agile project coordination

✓ Accessibility considerations

"Learned to make complex AI systems accessible to end users"

Collective Team Learning

Technical:

- Combining symbolic AI (Python) with LLMs
- Schema-validated extraction pipelines
- Cross-platform deployment strategies

Professional:

- Agile iteration in AI projects
- Risk-driven development approach
- Effective remote collaboration

Project Achievements

- Successfully demonstrated **hybrid AI architecture** combining LLMs with programmatic computation
- Achieved **production-ready deployment** on two platforms with real-world usability
- Validated approach on 4 **Latvian annual reports** with accurate ratio calculations
- Proved that **structured extraction + validation** prevents LLM hallucinations in financial context
- Created **comprehensive documentation** aligned with academic and industry standards

Recommendations for Future Work

Technical Recommendations

- Adopt test-driven development from project start
- Implement design systems before UI development
- Use structured knowledge bases alongside messaging
- Consider LangChain's advanced features (memory, error recovery)

Process Recommendations

- Rotate meeting facilitation for skill development
- Begin portfolio work immediately after development
- Time-box tasks to prevent scope creep
- Maintain comprehensive process evidence throughout

Questions & Discussion

- Live Demos

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- Repository

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