Graph Time

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1 Exploring Graph Data Models for Timetabling Insights

This is a Quarto website.

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2 Introduction

2.1 Intro 500 words

- Background on university timetabling challenges
- Motivation for exploring graph-based approaches
- Project scope and objectives

3 Data Engineering

3.1 Data Engineering: An End-to-End Solution (1500-2000 words)

3.1.1 2.1 Overview of the Data Pipeline

- High-level architecture (data flow diagram)
- Key features: modularity, configurability, scalability, error handling

3.1.2 2.2 Extraction Process

- Brief overview of SQL extraction techniques

3.1.3 2.3 Transformation and Anonymisation

- Detailed discussion of the Python-based transformation process
- Highlight of the anonymisation function
- Discussion on safeguarding personal identifiable information

3.1.4 2.4 Loading to Graph Database

- Challenges and solutions with Neo4j Aura
- Cloud vs. desktop considerations

3.1.5 2.5 Automation and Workflow

- End-to-end automated process for specific programme data

3.1.6 2.6 Lessons Learned and Iterative Development

- Reflection on the agile approach and discoveries made during development
- Potential future enhancements, developments

4 Graph Data Model

4.1 Graph Data Model for Timetabling (1000 words)

4.1.1 3.1 Comparison of Relational and Graph Models

- Visual representation of both models - mermaid, or simmilar

4.1.2 3.2 Advantages of the Graph Approach

4.1.3 3.3 Data Augmentation Opportunities

- Room properties example (lat, long)
- Potential for additional data integration (curriculum, student outcomes, etc.)

5 Timetable Metrics

5.1 Timetable Quality Metrics and Insights (1500-2000 words)

5.1.1 4.1 Defining Timetable Quality

5.1.2 4.2 Implemented Metrics

- Constraint violations (max hours per day, days per week, lunch breaks, etc.)
- Distance-based metrics using room properties

5.1.3 4.3 Aggregation Methods

- Student-level, programme-level, and other relevant groupings

5.1.4 4.4 Cypher Queries for Metric Calculation

- Example queries with explanations

5.1.5 4.5 Visualization of Results

- Bloom visualisations or other relevant charts

6 Future Opportunities

6.1 Future Opportunities and Potential Insights (500 words)

- Discussion of potential analyses (module combinations, student clustering, etc.)
- Integration of additional data sources

7 Conclusion

7.1 Conclusion (500 words)

- Summary of key achievements
- Reflection on the project's impact and potential for timetabling processes
- Future work and recommendations

8 References