Specialisation Project (VT)
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Platform for Investment Analysis

Python based Linear Programming Optimization for Optimal Energy Assets Management

Submitted by

Rui Vieira
Business Engineering Profile
IPP Institute of Product Development and Production Technologies

MSE | MASTER OF SCIENCE IN ENGINEERING

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1 Introduction

1.1 Project Context

Brief introduction to energy investment optimization and the need for automated analysis tools.

1.2 Objectives

- Develop a Python-based platform for energy investment analysis
- Implement linear programming optimization for asset management
- Create scenario analysis capabilities
- Provide AI-powered insights for decision support

2 Theoretical Background

2.1 Linear Programming in Energy Systems

Overview of optimization techniques in energy asset management.

2.2 DC Optimal Power Flow

Mathematical formulation and constraints.

2.3 Economic Analysis Framework

NPV calculations, investment metrics, and risk assessment methods.

3 Platform Architecture

3.1 System Design

Overall structure and component interaction.

3.2 Key Components

- Optimization engine
- Scenario generator
- Results analyzer
- AI critique module

4 Implementation

4.1 Core Optimization Module

Description of the linear programming implementation.

4.2 Scenario Analysis Framework

How different scenarios are generated and compared.

4.3 AI Integration

Implementation of AI-powered analysis features.

5 Results and Validation

5.1 Test Cases

Description of validation scenarios.

5.2 Performance Analysis

Computational efficiency and scalability.

5.3 Case Studies

Real-world applications and insights.

6 Discussion

6.1 Platform Capabilities

Current functionality and limitations.

6.2 Future Improvements

Potential enhancements and extensions.

7 Conclusion

Summary of achievements and recommendations.

A Technical Documentation

A.1 Installation Guide

A.2 User Manual

A.3 API Reference

B Mathematical Formulations

B.1 Optimization Model

B.2 Economic Calculations