Data Analysis Management System Using Object-Oriented Programming: Melbourne Housing Market

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Outline

Context

- Real estate agencies struggle with analyzing property data for market trends and price prediction.
- The project provides a Java-based system for data ingestion, analysis, and forecasting.
- It uses OOP principles to deliver user-friendly tools for data-driven decision-making.

Objectives

- Develop a structured real estate management system.
- Implement robust data handling and analysis mechanisms.
- Provide an intuitive reporting and visualization interface.

Libraries

- Java Standard Library (e.g., ‘java.io‘, ‘java.util‘, ‘java.sql‘)
- Apache Commons Math3 for statistical calculations (‘PearsonsCorrelation‘, ‘SpearmansCorrelation‘)
- JFreeChart for data visualization (e.g., charts, graphs)
- Apache POI for Excel file handling (‘XSSFWorkbook‘, ‘Sheet‘)
- JavaFX for building GUI components
- Swing for additional GUI elements (e.g., ‘JFrame‘, ‘JPanel‘, ‘JButton‘)

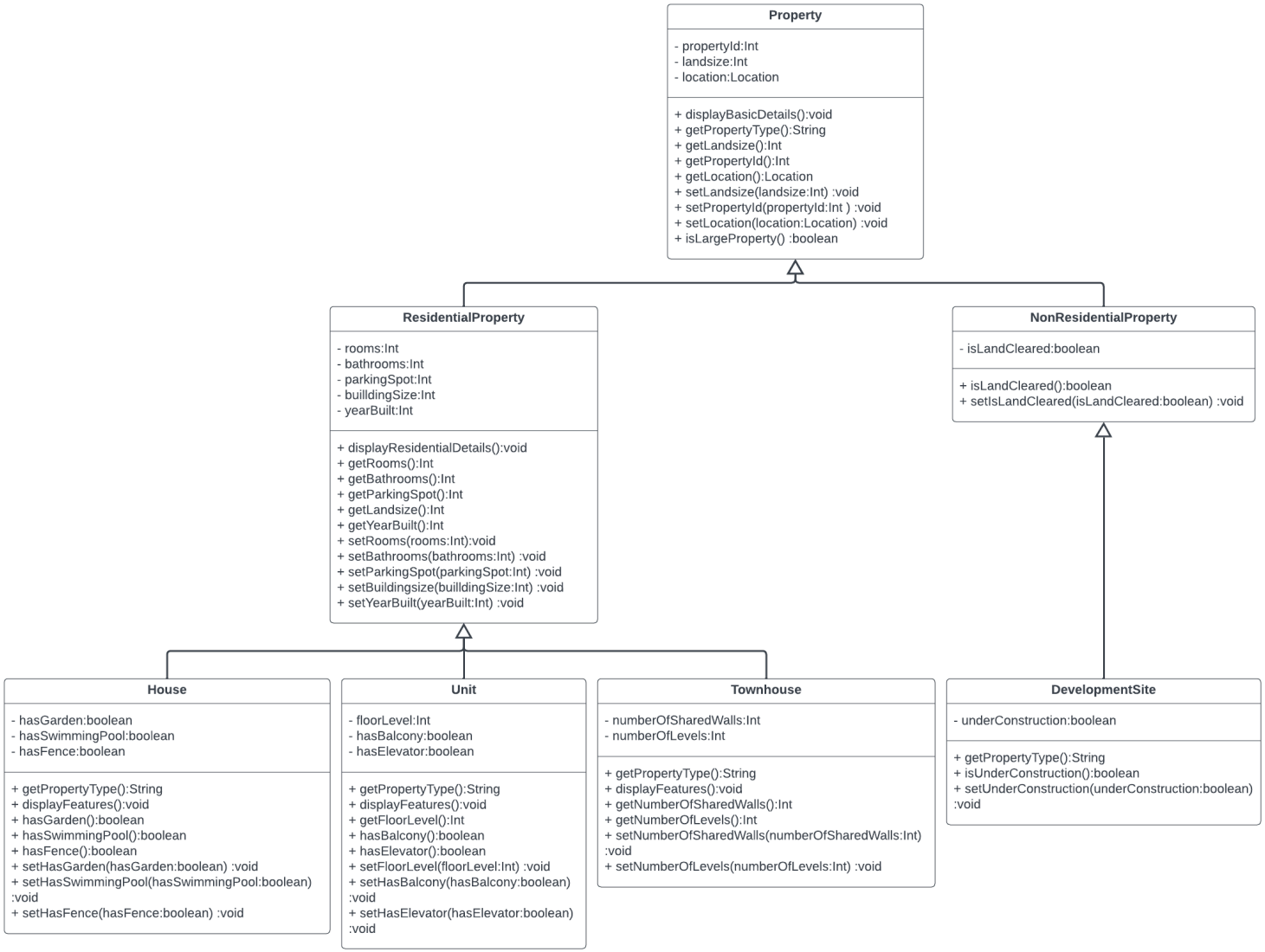
Dependencies

- **Apache POI** v5.2.3:reading and writing xlsx files
- **Log4j API** v2.20.0: Logging API for generating logs
- **Log4j Core** v2.20.0: Core implementation of Log4j
- **MySQL Connector/J** v8.0.33: connecting and interacting with MySQL
- **JFreeChart** v1.5.5:creating various types of charts
- **Apache Commons Math3** v3.6.1: mathematical and statistical functions
- **ELKI** v0.7.5: data mining library for clustering algorithms
- **JavaFX Controls** v20: building modern, cross-platform graphical user interfaces
- **AbsoluteLayout** vRELEASE230: simplified UI component positioning.

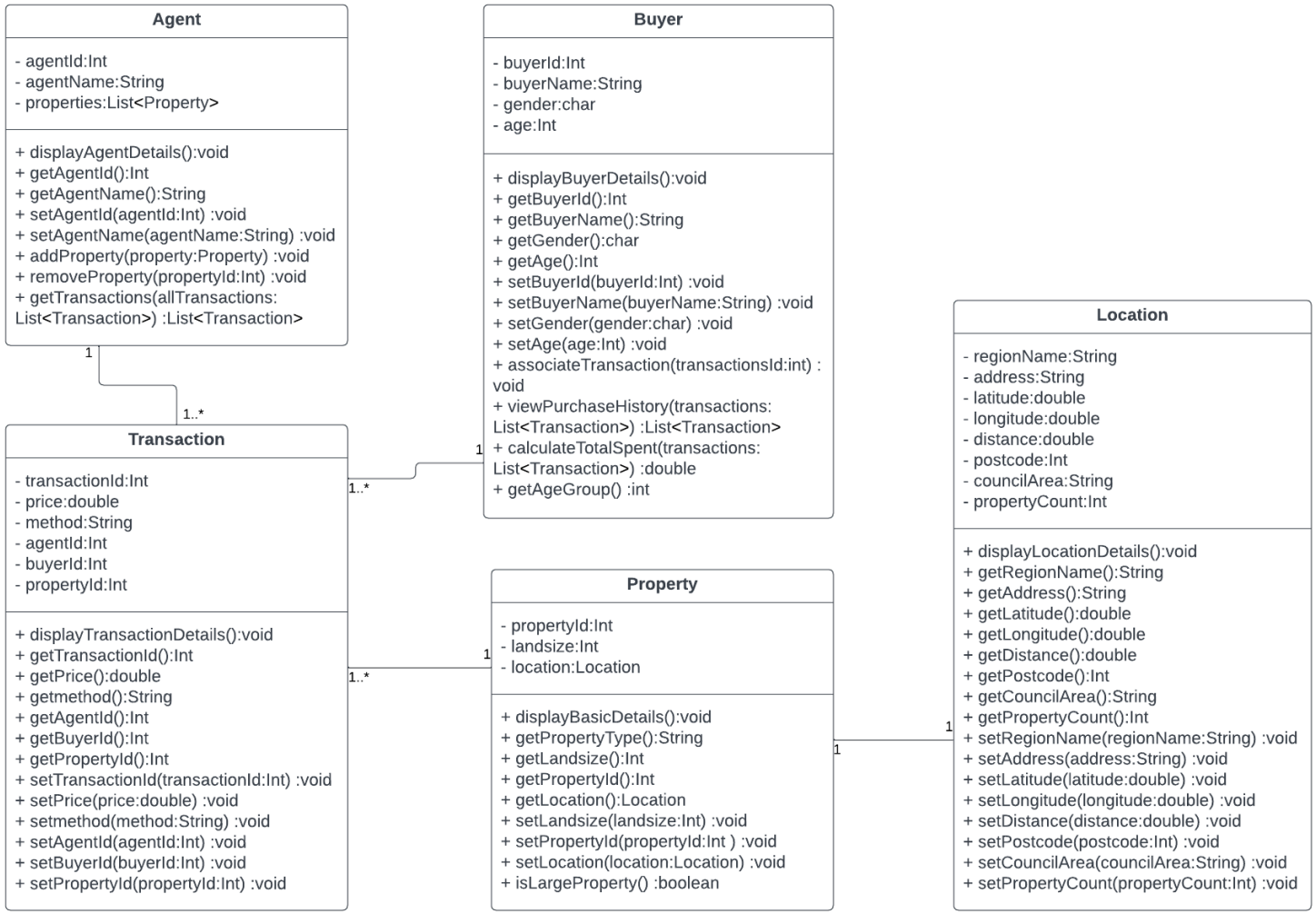
System Architecture

- **Main Class**: Runs the system.
- **Business Logic Layer**: Handles users, properties, and business entities.
- **Data Handling Layer**: Imports/export XLSX, CSV, and interfaces with the database.
- **Data Exploration Layer**: Descriptive statistics, visualization, and correlation analysis.
- **Machine Learning Layer**: Predictive models (e.g., Linear Regression, K-Means, KNN).
- **Dashboard Layer**: Separate program for interactive dashboarding.

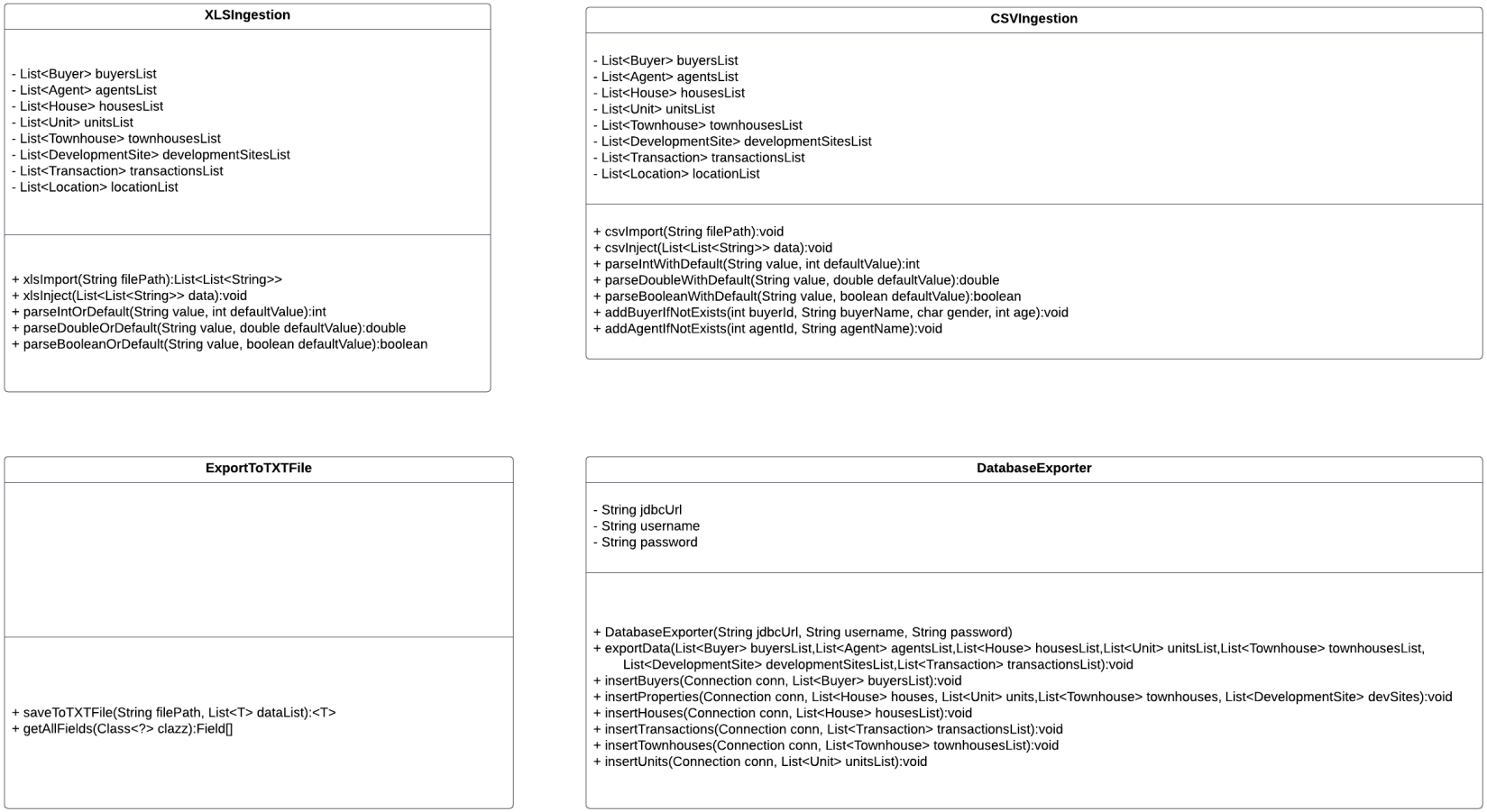
Class Diagram - Business Logic Layer



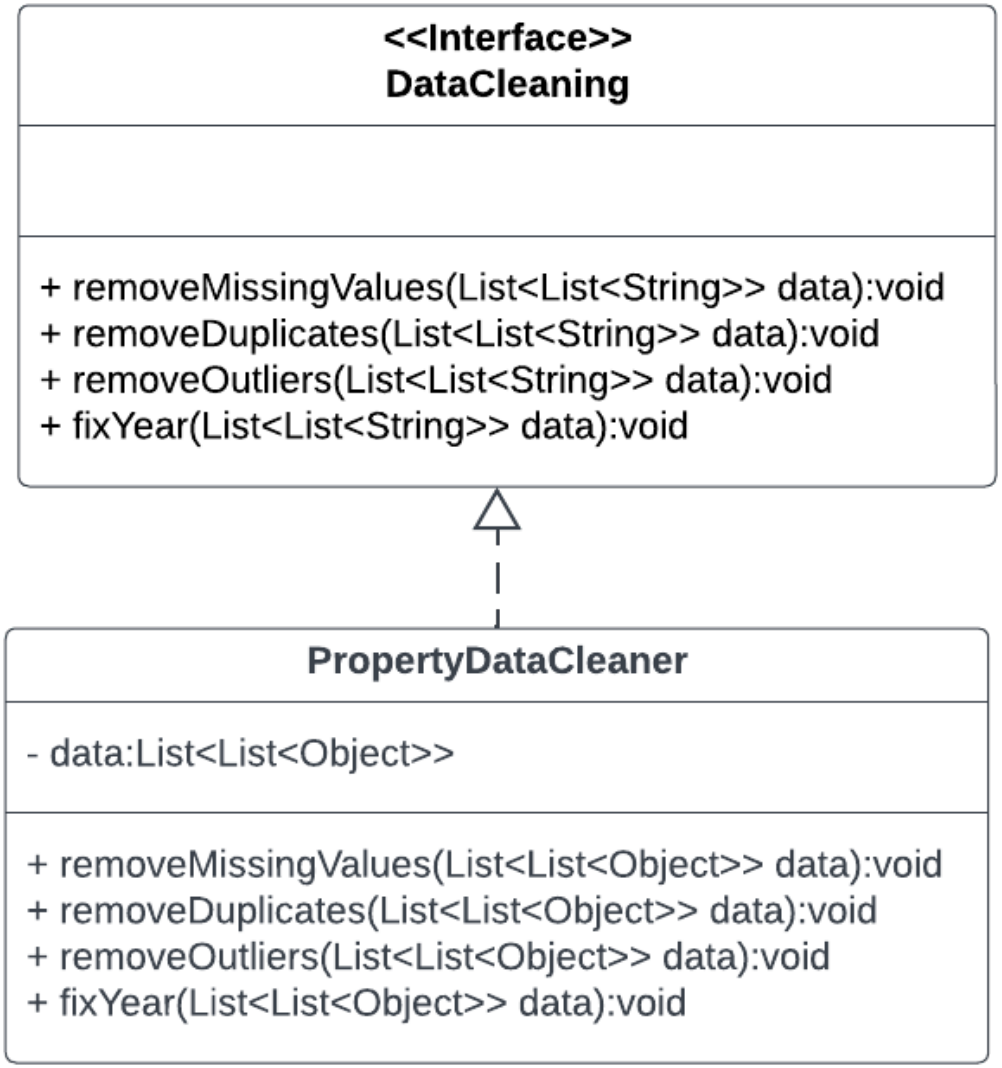
Class Diagram - Business Logic Layer



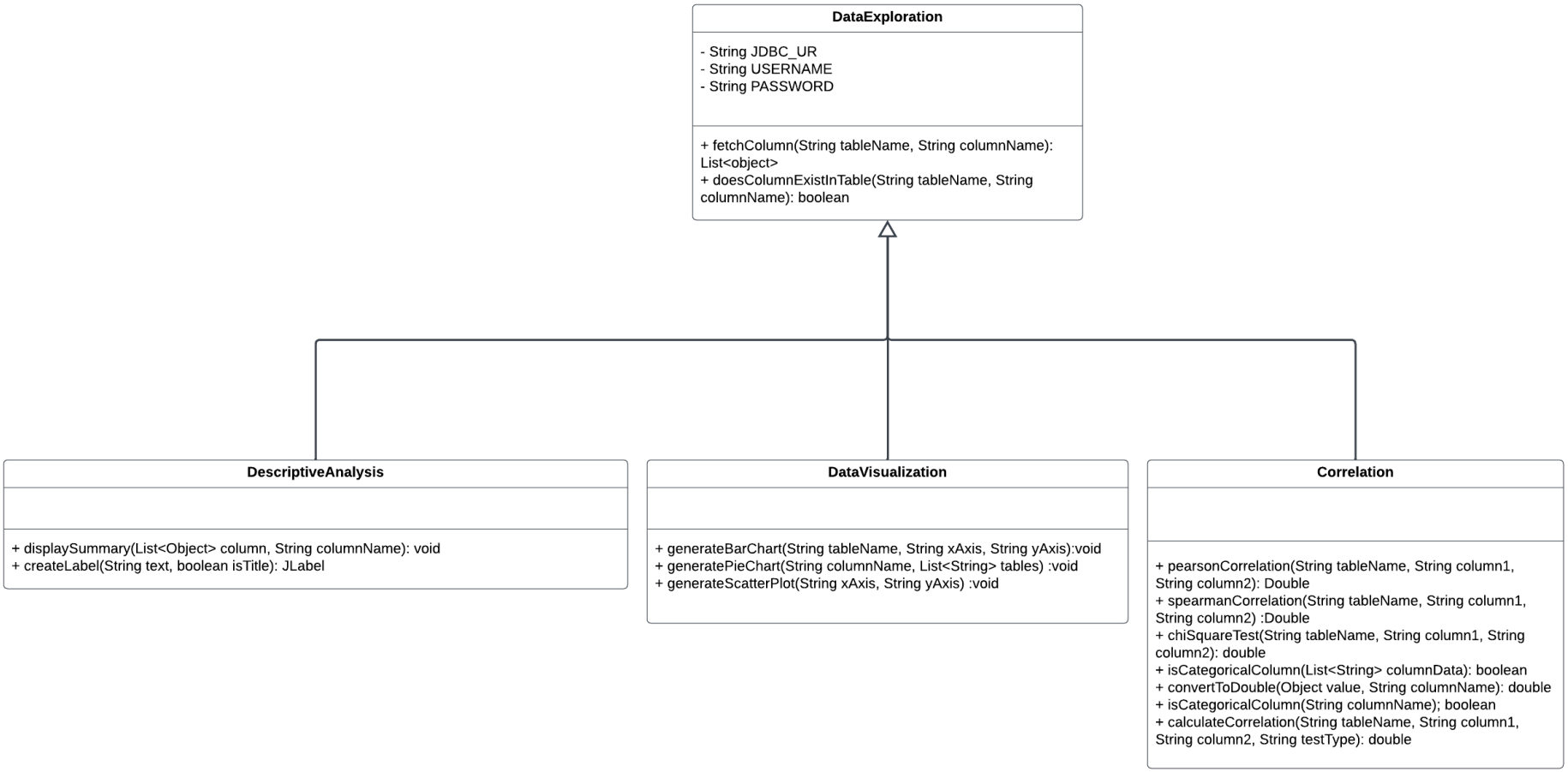
Class Diagram - Data Ingestion and Handling Layer



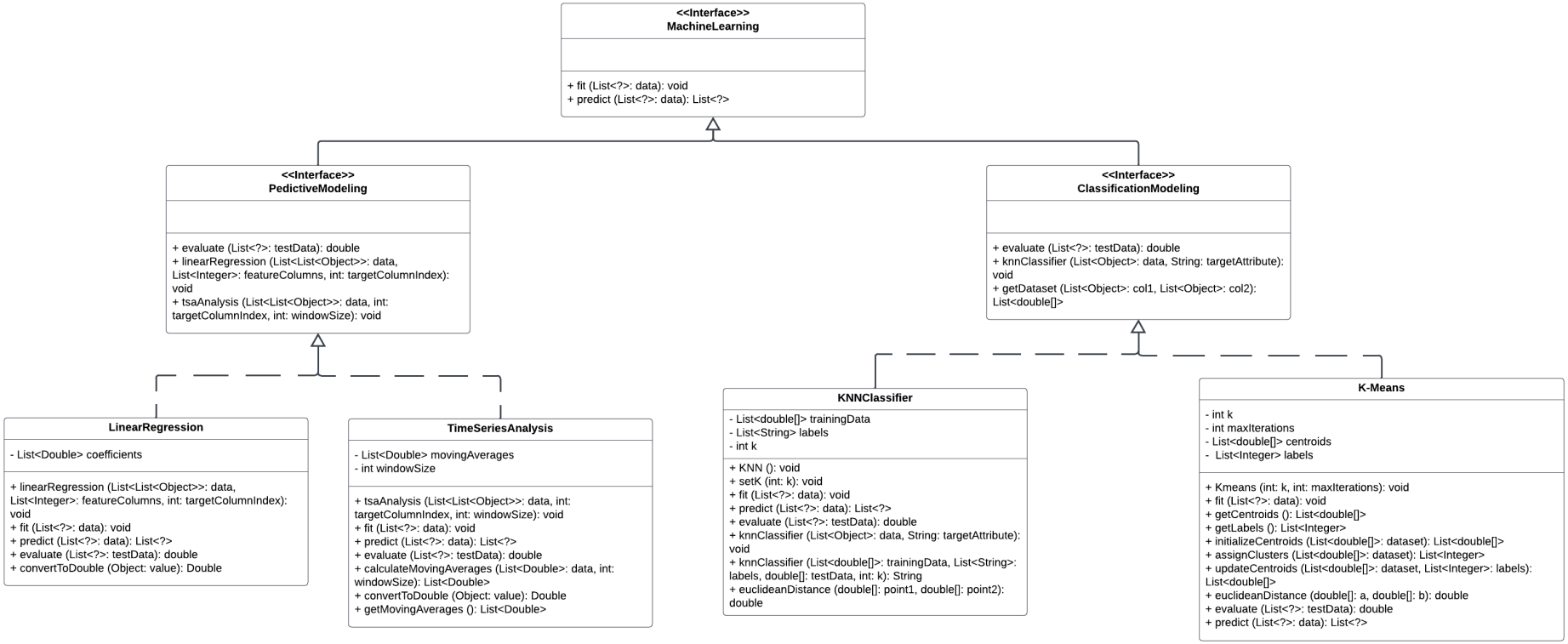
Class Diagram - Data Ingestion and Handling Layer



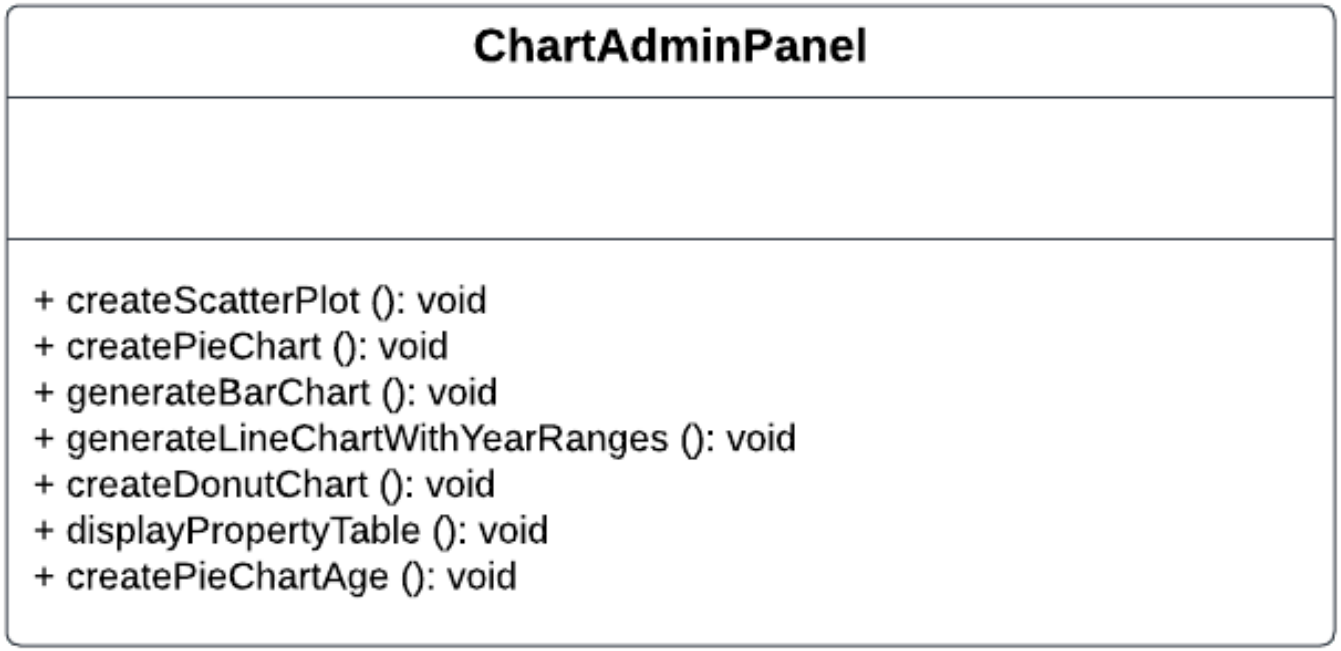
Class Diagram - Data Exploration and Analysis Layer



Class Diagram - Machine Learning Layer



Class Diagram - Dashboarding Layer



Benefits

- Enhanced data-driven decision-making for real estate agencies.
- Scalable system design for future real estate data integrations.
- Automated reporting with exports to PDF, PNG, and CSV for better visualization.
- Seamless integration of machine learning models for price prediction and trend forecasting.

Limitations

- Dashboard requires prior knowledge and may not be clear to all kind of users users.
- Scalability and handling large datasets may impact the functionality of system components.

Conclusion

- Comprehensive data analysis system for the real estate market.
- Integrates data handling, exploration, machine learning, and reporting.
- Provides valuable insights and supports data-driven decision-making.

Q&A

Thank you for listening!

Your feedback will be highly appreciated!