Project: RealtyAI Smart Real Estate Insight Platform

Project Statement:
Develop an AI platform that evaluates property conditions, predicts price trends, and segments satellite images of real estate regions. This system is useful for property buyers, investors, and urban planners.

Outcomes:
Understand preprocessing techniques for real estate images and tabular data
Develop models for segmentation, classification, and time series prediction
Deliver insights through a dashboard with visual analytics

Dataset Links:
[Zillow Transaction Data](https://www.kaggle.com/datasets/zillow/zecon)
[Kaggle Housing Prices](https://www.kaggle.com/competitions/housepricesadvancedregressiontechniques/data)
[SpaceNet Aerial Imagery](https://spacenet.ai/datasets/)

Modules:
1. Data Collection and Cleaning
2. Image Preprocessing and Satellite Segmentation
3. Property Condition Classification
4. Price Prediction Model
5. TimeSeries Trend Forecasting
6. Evaluation and Visualization
7. Report and Presentation

Milestone I:
Week 1: Dataset Acquisition and Exploration.
Download Zillow, SpaceNet, and Housing datasets.
Explore features: location, price, age, and image resolution.
Initial data exploration(basic statistics).
Week 2: Data Cleaning and Annotation.
Handle missing data, and outliers, and normalize values.
Annotate images for building masks, and quality scores.
Exploratory data analysis(visualization).
data preprocessing (preparing data for modeling).

Milestone II:
Week 3: Image Segmentation Module
Train UNet or DeepLab model on satellite images to detect residential/commercial zones.
Save the initial model and results.
Week 4: Data Modelling.
Use CNN (e.g., ResNet) to classify property conditions (new, moderate, old) from images.
model training+model selection, fine-tuning/optimizing, inferencing.

Milestone III:
Week 5: Price Prediction Module.
Build regression model (XGBoost or LightGBM) using tabular features.
Week 6: Trend Forecasting.
Use LSTM or Prophet to predict price trends over time for regions.

Milestone IV:
Week 7: Evaluation and Dashboard Creation.
Evaluate models with MAE, RMSE, and accuracy.
Create dashboards to visualize segmentation and pricing insights.
Week 8: Final Reporting and Demo.
Prepare documentation, and results, and present the dashboard with a live demo

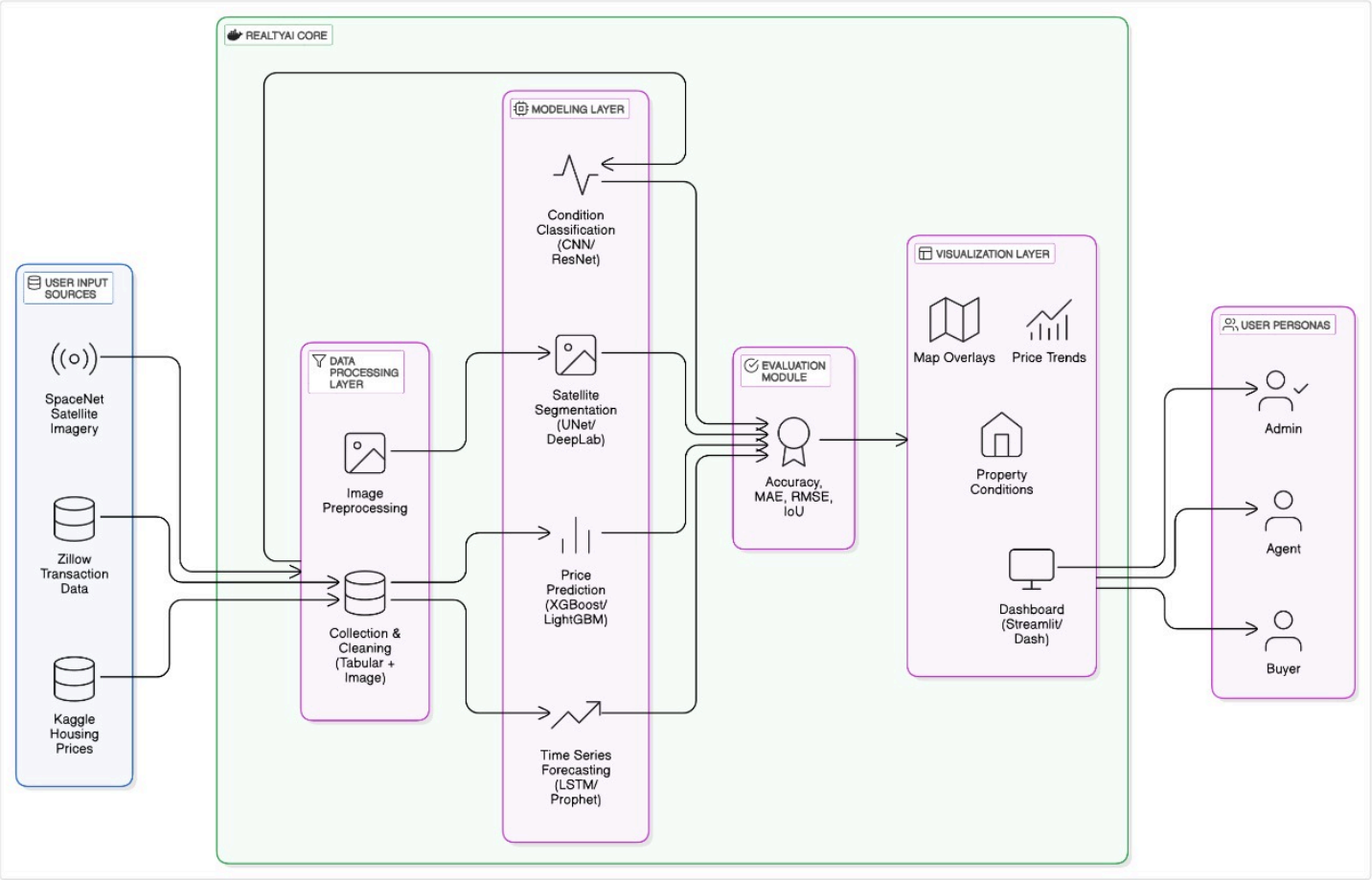
Workflow:
1. Raw data → preprocessing (images + tabular)
2. Image segmentation for region labeling
3. CNN model for condition tagging
4. Regression for price prediction
5. Time series forecast for market trend
6. Combine into the dashboard using Streamlit / Dash

Tools & Stack:
Languages -
Python

Libraries -
Pandas
NumPy
OpenCV
GeoPandas
Folium
scikit-learn
Matplotlib / Seaborn
Dash or Streamlit

ML/DL Frameworks -
TensorFlow or PyTorch
U-Net / DeepLab (for segmentation)
ResNet (for classification)
XGBoost or LightGBM (for regression)
LSTM / Prophet (for forecasting)

Architecture Diagram:



Evaluation Criteria:

Milestone Completion

Timely completion of each 2-week milestone.

All core modules implemented and tested (segmentation, classification, regression, forecasting).

Model Performance

Segmentation: IoU, Dice Score.

Property Classification: Accuracy, Precision, Recall.

Price Prediction: MAE (Mean Absolute Error), RMSE (Root Mean Square Error).

Market Trend Forecasting: MAPE (Mean Absolute Percentage Error), RMSE.

System Integration and Usability.

Correct aggregation of model outputs into a working dashboard.

Easy-to-understand visualizations for buyers/investors.

Responsive and intuitive front-end (Streamlit or Dash).

Presentation and Documentation

Organized final report covering problem, data, models, and insights.

Use of charts, maps, and prediction visuals in a presentation.

Professional explanation of use cases and potential impact.