

1 Project Charta

1.1 Problem Definition

What is the problem?

The challenge is to develop a machine learning system that predicts the rental or selling price of residential properties. Currently, renters and buyers rely on manual and often subjective methods to assess property value. This leads to inefficiencies, missed opportunities, and mispriced listings.

Domain/Business Area

The project operates within the Swiss real estate market, involving rental agencies, private buyers and sellers, and expanding corporations. Real estate platforms like UrbanHome, ImmoScout24 and others are relevant sources.

Expected Benefit

The tool will help users, especially renters and buyers, find properties with the best price-to-quality ratio. It provides landlords and sellers with better pricing strategies and enables data-driven decision-making.

Why this effort?

An ML-powered property price predictor can dramatically reduce the time and uncertainty involved in the property search process. By learning from real data, the model helps stakeholders make informed choices aligned with their financial and lifestyle needs.

Stakeholders

| Stakeholder | Role | Goal | Relationship |
|-------------------|---------------------------------------|--------------------------------------|--------------------------------------|
| Buyers/Renters | Users of the predictor | Find the best value-for-money home | Interested in accuracy and usability |
| Sellers/Landlords | Input providers and users | Price fairly and competitively | Interested in fair predictions |
| Project Team | Developers and analysts | Build the system within 4 weeks | Provides value to both user groups |
| Data Sources | Real estate websites (UrbanHome etc.) | Provide structured/unstructured data | Data dependency |

1.2 Situation Assessment

Resources

- **Personnel:** 3 people
- **Software/Tools:** VS Code, Python, SQLite, HTML, JS, CSS
- **Infrastructure:** Local development environments
- **Data Sources:** Real estate listing websites
- **Time:** 4 weeks (192 hours total)

Constraints

- All data must be acquired from public websites via scraping.
- Must handle dynamic content, inconsistent formats, and ensure data privacy and legality.

Restrictions

- Limited project time and small team size.
- No access to private or premium datasets.

Risks

- Lack of deep experience in ML model optimization.
- Time constraints may limit dashboard and DL integration quality.

1.3 Project Goals and Success Criteria

Qualitative Goals

- Develop a working ML model that predicts property prices.
- Visualize the results in a user-friendly dashboard.
- Enhance accuracy with tabular and image-based features.

Success Criteria and Metrics

- At least 1,000 unique properties scraped and processed.
- Classical regression model achieves $MAE < 300 \text{ CHF}$ or $R^2 > 0.75$.
- Dashboard allows users to query a property and receive a predicted price.
- Integration of deep learning features shows performance improvement over baseline.

Out of Scope

- Commercial deployment
- Legal contracts, compliance, and regulatory integration
- Mobile applications

1.4 Data Mining Goals

Task Mapping

- **Primary Task:** Regression, to predict continuous property prices
- **Subtasks:** - Classification, for image room types or amenity presence - Visualization, for dashboard output and EDA

Datasets to Be Used

- Scraped tabular data (price, rooms, size, location, etc.)
- Downloaded property images
- Optionally enriched with geographic/statistical data from APIs

Target Metrics

- **Regression:**
 - $MAE < 300$ CHF
 - $R^2 > 0.75$
- **Classification (images):**
 - Accuracy > 0.8
 - F1-score > 0.75 (for multi-label classification)

1.5 Roles and Contact Details

| Name | Role | Tasks | Contact |
|------------------------|----------------|---|---------------------------|
| Josh | Data Engineer | Web scraping, data cleansing, DB design | richtjos@mail.gvsu.edu |
| Alessandro Mazzeo | ML Developer | Feature engineering, model training, evaluation | mazzale@students.zhaw.ch |
| Antonio Michal Verdile | Full Stack Dev | Dashboard development, ML integration, UI/UX design | verdiant@students.zhaw.ch |