Final Report: Expanding the Scope of the Real Estate Chatbot with In-System Analytics

---

1. Introduction:

The goal of this report is to provide a comprehensive and practical solution for expanding the scope of the real estate chatbot. The current chatbot focuses on core features such as transaction dates, transaction types, number of rooms, amenities, and property age. However, users are seeking more comprehensive and in-depth answers regarding **property valuation**, **purchase risks**, and **investment opportunities**. This report proposes solutions that allow the chatbot to answer these questions using **existing data** (without the need for complex external data).

---

2. Proposed Analytics:

2.1. Price Dispersion Analysis:

- **Description**: The chatbot can calculate the **average price** and **standard deviation** of recent transactions in the area using transaction data (Transaction_Date and Price).
- **Application**:
    - If the price standard deviation is high:
      "The average price in this area is stable, but the price dispersion is very wide. This may indicate high risk, as prices are highly volatile."
    - If the price standard deviation is low:
      "Prices in this area are stable, indicating lower investment risk."

2.2. Days on Market Analysis:

- **Description**: The chatbot can analyze the time it takes to sell properties (Days_on_Market).
- **Application**:
    - If properties take a long time to sell in the area:
      "Properties in this area sell slowly. This may indicate low demand or improper pricing."
    - If properties sell quickly:
      "Properties in this area sell quickly. This indicates high demand and good investment opportunities."

2.3. Price-to-Rent Ratio Analysis:

- **Description**: The chatbot can calculate the ratio of purchase price to rental income (Price-to-Rent Ratio).
- **Application**:
    - If the price-to-rent ratio is high:
      "Buying property in this area may be expensive and yield low rental income."
    - If the price-to-rent ratio is low:
      "Buying property in this area could be profitable, as it offers high rental yield."

2.4. Price Trend Analysis:

- **Description**: The chatbot can analyze price trends over a specific period using transaction data (Transaction_Date and Price).
- **Application**:
    - If prices are increasing:
      "Prices in this area are rising. This may indicate good investment opportunities."
    - If prices are decreasing:
      "Prices in this area are declining. This may indicate high investment risk."

2.5. Price per Square Meter Analysis:

- **Description**: The chatbot can calculate and analyze the price per square meter of properties.
- **Application**:
    - If the price per square meter is high:
      "The price per square meter in this area is high. This may indicate an expensive neighborhood."
    - If the price per square meter is low:
      "The price per square meter in this area is low. This may indicate good buying opportunities."

2.6. Property Condition Analysis:

- **Description**: The chatbot can analyze the condition of the property (Condition).
- **Application**:
    - If the property requires renovation:
      "This property requires renovation, which may incur additional costs for you."

    - If the property is in good condition:
      "This property is in good condition and does not require additional costs."

2.7. Amenities Analysis:

- **Description**: The chatbot can analyze the amenities of the property (Amenities).
- **Application**:
    - If the property has many amenities:
      "This property has many amenities, which can increase its value."
    - If the property has few amenities:
      "This property has few amenities, which may affect its value."

---

3. Benefits of These Analytics:

- **No Need for External Data:** These analytics are based on existing data within the system and do not require complex external data.
- **High Speed:** The chatbot can perform these analyses quickly and provide instant responses to users.
- **Added Value for Users:** Users can make better decisions about buying or selling properties using these insights.

---

4. Final Summary and Implementation Recommendations:

To expand the scope of the chatbot and address user questions, we recommend adding the following analytics to the system:

1. **Price Dispersion Analysis**
2. **Days on Market Analysis**
3. **Price-to-Rent Ratio Analysis**
4. **Price Trend Analysis**
5. **Price per Square Meter Analysis**
6. **Property Condition Analysis**
7. **Amenities Analysis**

These analytics will help the chatbot answer user questions about **valuation**, **risk**, and **investment opportunities**. These features do not require complex external data and can be implemented quickly.
