PROJECT REPORT

1. INTRODUCTION

1.1 Project Overview

This project focuses on building an **interactive Tableau dashboard** to visualize and analyze **housing market trends**, specifically focusing on **sale prices and key property features** (e.g., number of bedrooms, location, size, year built). By leveraging real estate datasets, the goal is to help **home buyers, investors, agents, and analysts** make **informed decisions** by uncovering hidden patterns and market dynamics through **intuitive data visualizations**.

1.2 Purpose

To provide an **interactive and data-driven visualization platform** using Tableau that helps **home buyers, investors, real estate agents, and analysts** understand housing market trends through the analysis of **sale prices and property features** over time and across locations.

2. IDEATION PHASE

2.1 Problem Statement
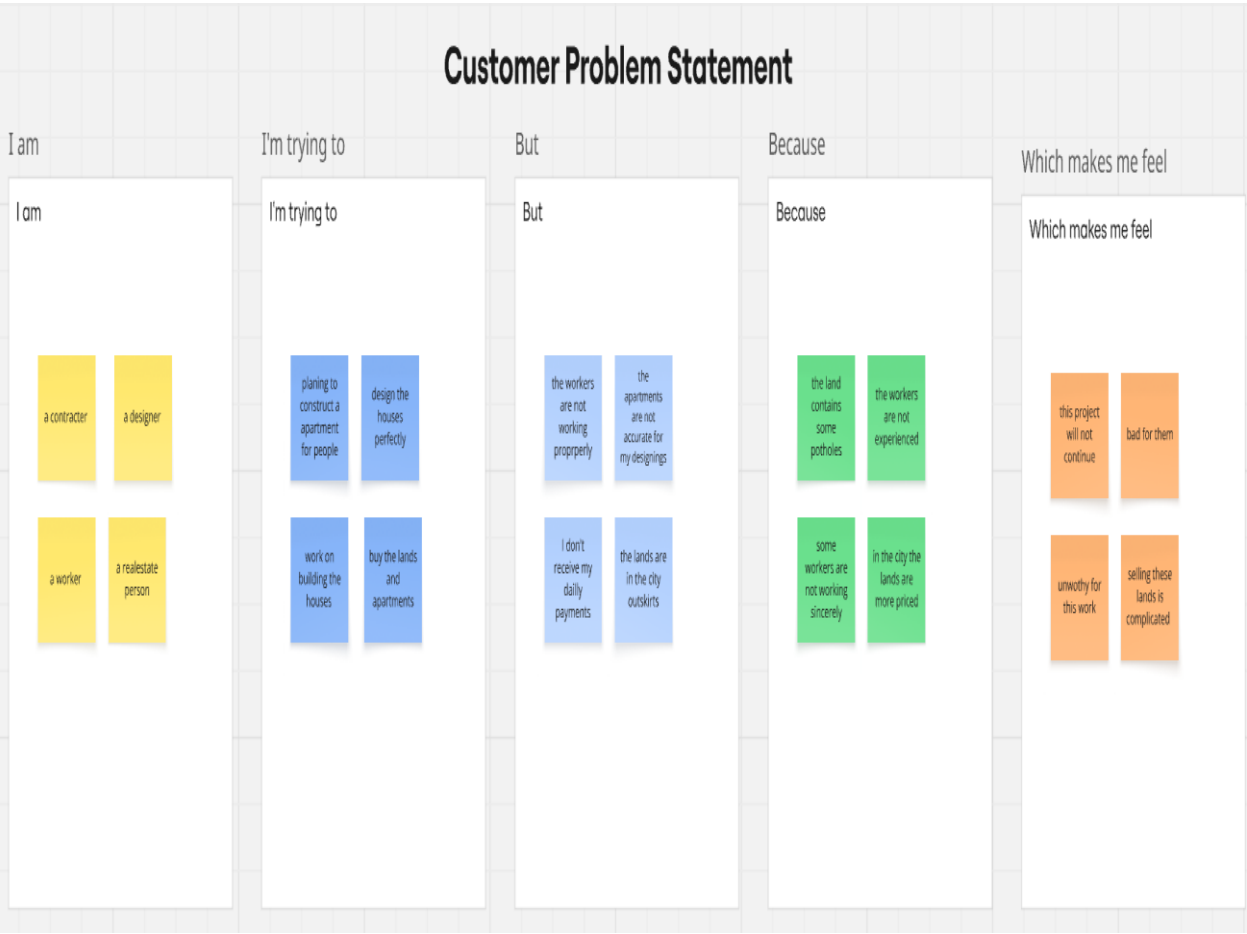
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Problem Statement (PS)	I am	I am trying to	But	Because	Which makes me feel
PS-1	A contractor	planning to construct an apartment for people	the workers are not working properly	the land contains some potholes	this project will not continue
PS-2	a designer	design the houses perfectly	the apartments are not accurate for my design	the workers are not experienced	Frustrated on the workers for the lack of experience
PS-3	a worker	work on building the houses	I do not receive my daily payments	some workers are not working sincerely	unworthy for this work
PS-4	a real estate person	buy the lands and apartments	the lands are in the city outskirts	in the city the lands are more priced	selling these lands is complicated

2.2 Empathy Map Canvas

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Empathy Map

SAYS
- "Can I filter by number of bedrooms or size?"
- "I want a quick overview but also deep dive when needed."
- "Show me the price trend over the last 5 years."

THINKS
- "Which area gives me the best value for money?"
- "Am I making the right investment?"
- "I want to understand how the market has changed over time."

DOES
- Talk to agents or brokers.
- Use Google or property websites for raw data.
- Explore dashboards or visual tools for easier analysis.

FEELS
- Stressed due to high financial stakes in buying/ selling homes.
- Curious but overwhelmed by too much scattered data.
- Empowered when data is clear, visual, and interactive.

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2.3 Brainstorming

Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

- 🕐 **10 minutes** to prepare
- ⏳ **1 hour** to collaborate
- 👤 **2-8 people** recommended

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

🕐 10 minutes

A **Team gathering**
Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

B **Set the goal**
Think about the problem you'll be focusing on solving in the brainstorming session.

C **Learn how to use the facilitation tools**
Use the Facilitation Superpowers to run a happy and productive session.

Open article →

Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

🕐 5 minutes

PROBLEM

How might we [your problem statement]?
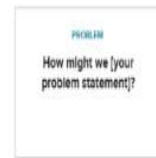
Key rules of brainstorming
To run an smooth and productive session

- 🙂 Stay in topic.
- 💡 Encourage wild ideas.
- 🤐 Defer judgment.
- 👂 Listen to others.
- 📜 Go for volume.
- 👁 If possible, be visual.

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2 Brainstorm

Write down any ideas that come to mind that address your problem statement.

⏱ 10 minutes

TIP
You can select a sticky note and hit the pencil (switch to sketch) icon to start drawing!

- Box plot of price by property type or region
- Map with price color-coded by zip code/ city
- Stacked bar chart: number of properties by # of bedrooms and bathrooms
- Bar chart: number of sales per month/year
- Histogram of sale prices
- Heatmap showing volume of transactions geographically

3 Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

⏱ 20 minutes

TIP
Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.

- By State / Region / City / Zip Code
- Price per square foot range groups
- Yearly or Monthly Trends
- Number of Bedrooms / Bathrooms
- Year Built / Renovation Year
- Home Type (Apartment, Detached, Semi-detached, Condo)
  -

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3. REQUIREMENT ANALYSIS

3.1 Customer Journey map

| Stage	Need	Action	Touchpoint	Pain point	Opportunity
Discover	Understand the importance of visualizing real estate trends	Searches Google, reads blogs or market reports	Google Search, Tableau Blog, LinkedIn, YouTube tutorials	Too much scattered data; unsure where to start	Create awareness via blog series, webinars, or LinkedIn posts
Explore	Identify tools, data sources, and examples for visualization	Compares Tableau with Excel, Power BI, etc.	Tableau trial version, real estate forums, data portals	Unsure how Tableau handles real estate data	Offer real estate-specific templates or Tableau sample workbooks
Engage	Collect and clean data; begin designing dashboards	Downloads data, preps it using Tableau Prep or Excel	Tableau Desktop, Tableau Prep, Zillow/Redfin/MLS data	Dirty or inconsistent data; dashboard logic confusion	Provide step-by-step guides and training content
Decide	Finalize and share insights; take investment or reporting action	Builds final dashboard, presents to stakeholders	Tableau Server, Tableau Public, Email, PDF export	Stakeholders struggle to interpret complex visuals	Embed story points, tooltips, filters, and user guides

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3.2 Solution Requirement

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Data Import	The system should allow the user to upload or connect to housing datasets in formats like CSV, Excel, or databases (SQL).
FR-2	Time Series Visualization	The dashboard should visualize **sale price trends over Time**.
FR-3	Geographic Visualization	Display a **map view** showing sale prices and density across different regions
FR-4	Dashboard Sharing	Users should be able to **export dashboards** (PDF) or **share online** via Tableau Public or Server.
FR-5	Comparative Analysis	Allow the user to compare housing features, such as **price vs square footage** using scatter plots.
FR-6	Time Series Visualization	The dashboard should visualize **sale price trends over Time**.

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Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Performance	Dashboards must load within 3–5 seconds even with filters applied.
NFR-2	Scalability	The dashboard must handle **larger datasets** efficiently without crashing or lag.
NFR-3	**Responsiveness**	Dashboard layout should be usable on laptops and projectors during presentations.
NFR-4	**Security & Privacy**	The system should protect **sensitive data** and follow privacy regulations if address-level or user data is used.
NFR-5	**Usability**	The dashboard must be **intuitive**, easy to navigate, and require minimal training.
NFR-6	**Data Accuracy**	The system must ensure **clean, accurate, and regularly updated** data sources.

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3.3 Data Flow Diagram
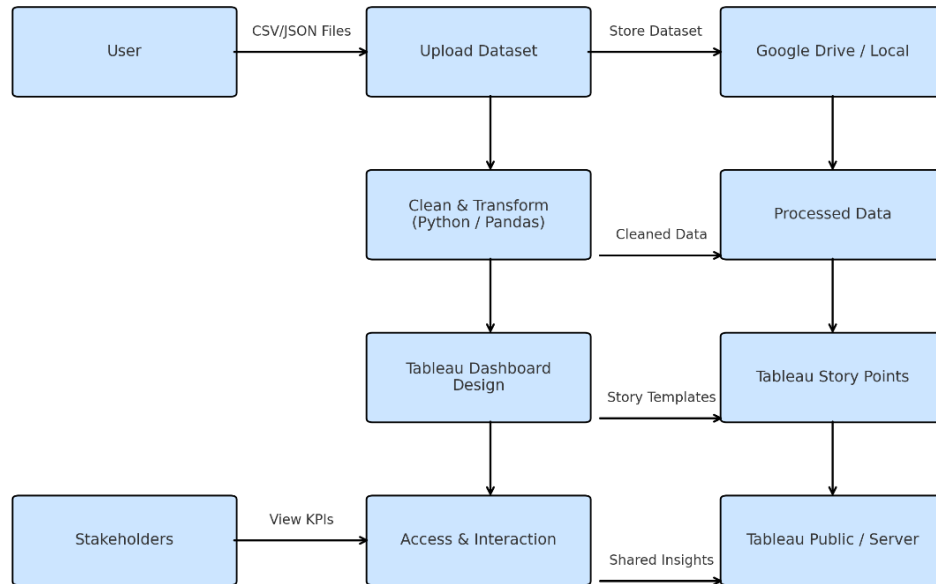
3.4 Technology Stack

Component	Tool/Technology	Purpose
Data Source	CSV, JSON files	Raw smartphone sales and specs data
Visualization	Tableau Desktop	Creating interactive dashboards and stories
Storage	Google Drive / Local	Storing raw and processed datasets
Collaboration	Google Docs, Slack	Team communication and report writing
Deployment	Tableau Public / Server	Dashboard sharing and stakeholder access

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4. PROJECT DESIGN

4.1 Problem Solution Fit

4.2 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Understanding and analyzing housing market trends can be challenging due to the complexity and volume of real estate data. Users lack intuitive tools to interpret pricing patterns and property features
2.	Idea / Solution description	The project proposes an interactive data visualization dashboard built using Tableau to analyze and interpret housing market data. The dashboard will show trends in sale prices and the impact of key features.

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3.	Novelty / Uniqueness	Unlike static reports, this solution offers dynamic visualizations that allow real-time interaction. The integration of geospatial analysis with property features is a unique strength.
4.	Social Impact / Customer Satisfaction	The solution helps buyers, sellers, and real estate analysts make informed decisions. It improves transparency in the housing market and empowers customers with easy-to-understand data insights.
5.	Business Model (Revenue Model)	The solution can be monetized as a data analytics product or service for real estate agencies, governments, or financial institutions. It can also be offered as a freemium model with premium customization.
6.	Scalability of the Solution	The dashboard can be scaled by integrating real-time APIs, covering more regions, and expanding features such as predictive analytics. It can also be deployed across cloud platforms for broader accessibility.

4.3 Solution Architecture
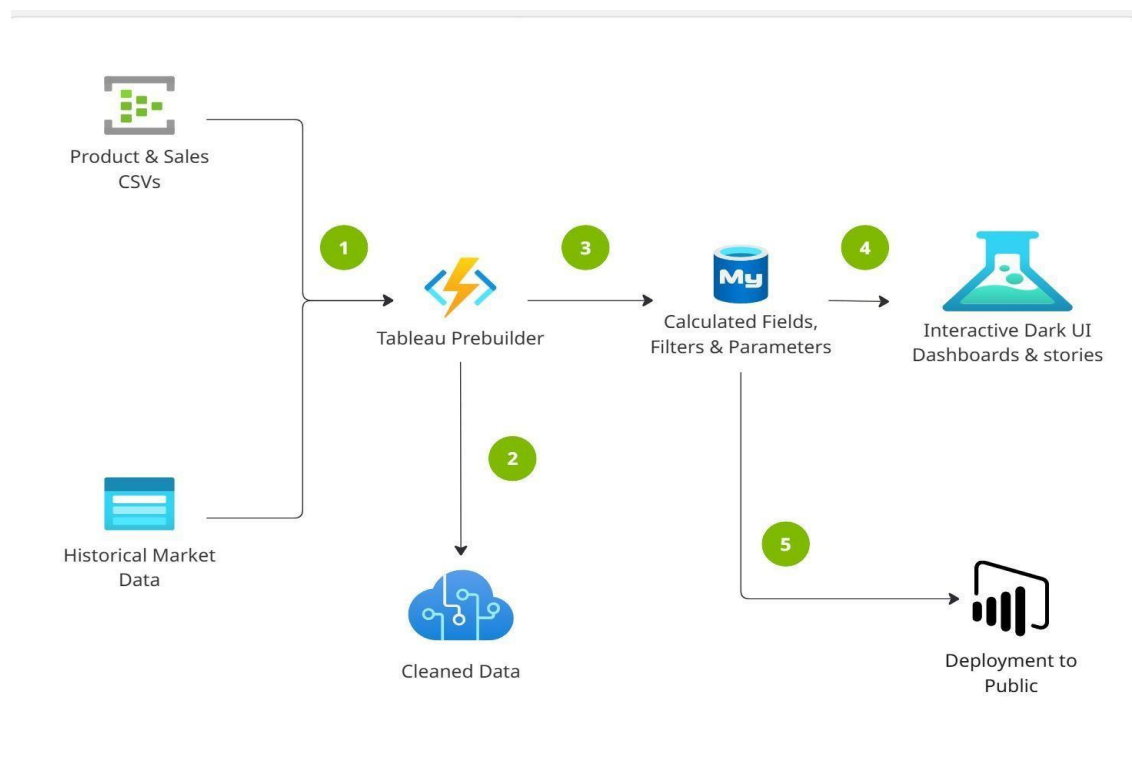
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5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

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Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Data Collection	USN-2	As a user, I can load data into the processing environment	1	High	ALL
Sprint-2	Data Preprocessing	USN-3	As a user, I can handle missing values in the dataset	3	Medium	ALL
Sprint-2	Data Preprocessing	USN-4	As a user, I can encode or map categorical variables appropriately	2	Medium	ALL
Sprint-3	Making Graphs/Visualizations	USN-5	As a user, I can build the initial model based on processed data	5	High	ALL
SPRINT - 4	Dashboard & STORIES	USN - 6	Dark ui with eye feasted color palette	6	HIGH	ALL
SPRINT - 5	Report & documentation	USN - 7	The step-by-step guide documentation	7	MEDIUM	ALL

## 6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

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S.No.	Parameter	Screenshot / Values
1.	Data Rendered	10,000 rows from CSV dataset (e.g., housing_data.csv)
0.	Data Preprocessing	Removed 132 records with missing sale price or area
3.	Utilization of Filters	Applied Tableau filters for city/region, sale year, bedrooms/bathrooms, price range and getting responsiveness in 3 seconds
4.	Calculation fields Used	- Average Price per sqft - Average price by city - YOY price growth
5.	Dashboard design	No of Visualizations / Graphs 1 Dashboards
6	Story Design	No of Visualizations / Graphs – 1 Stories with 4 story points each

7. RESULTS

7.1 Output Screenshots

DASHBOARDS:
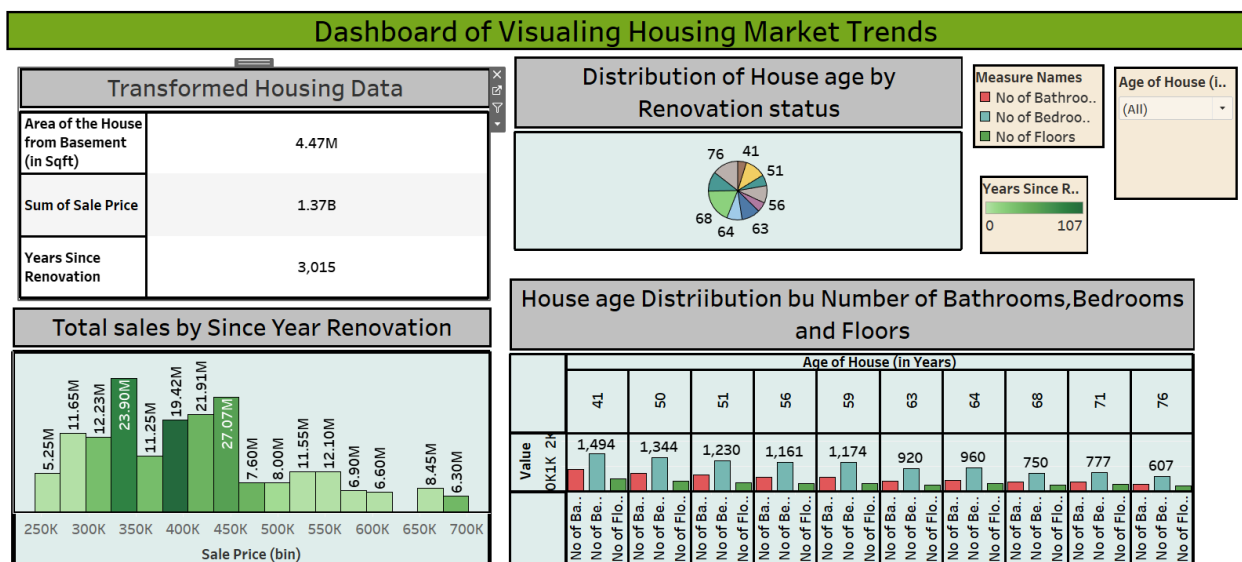
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Story 1

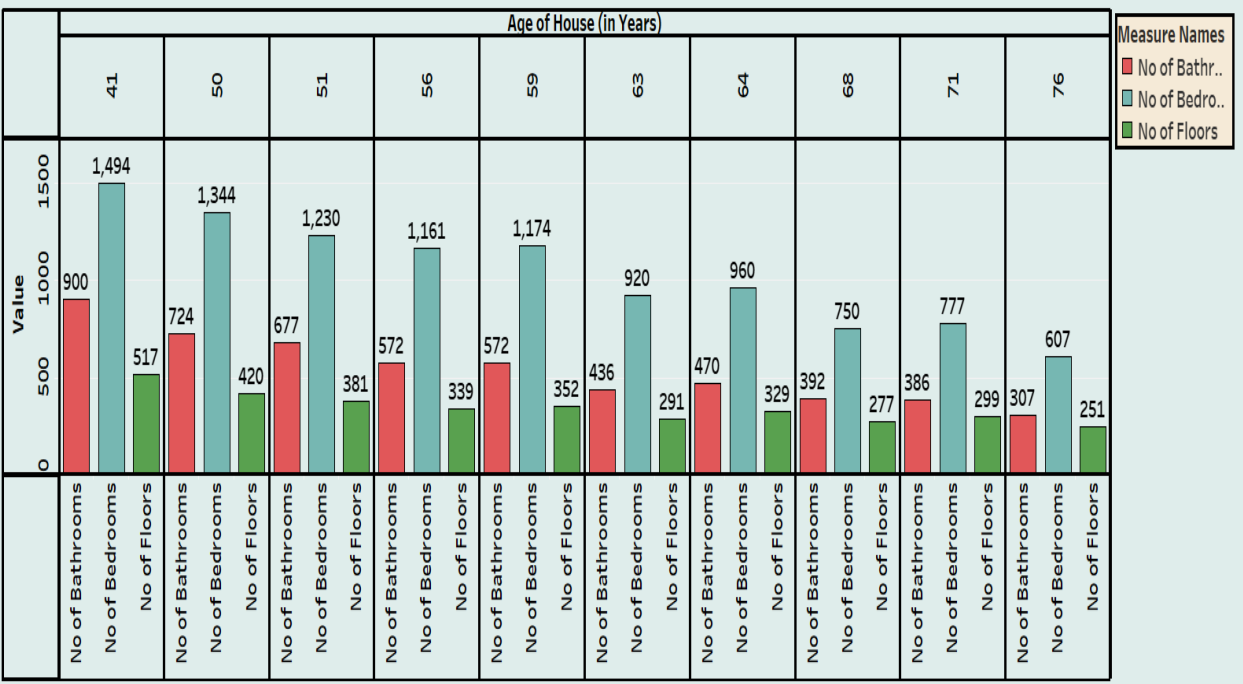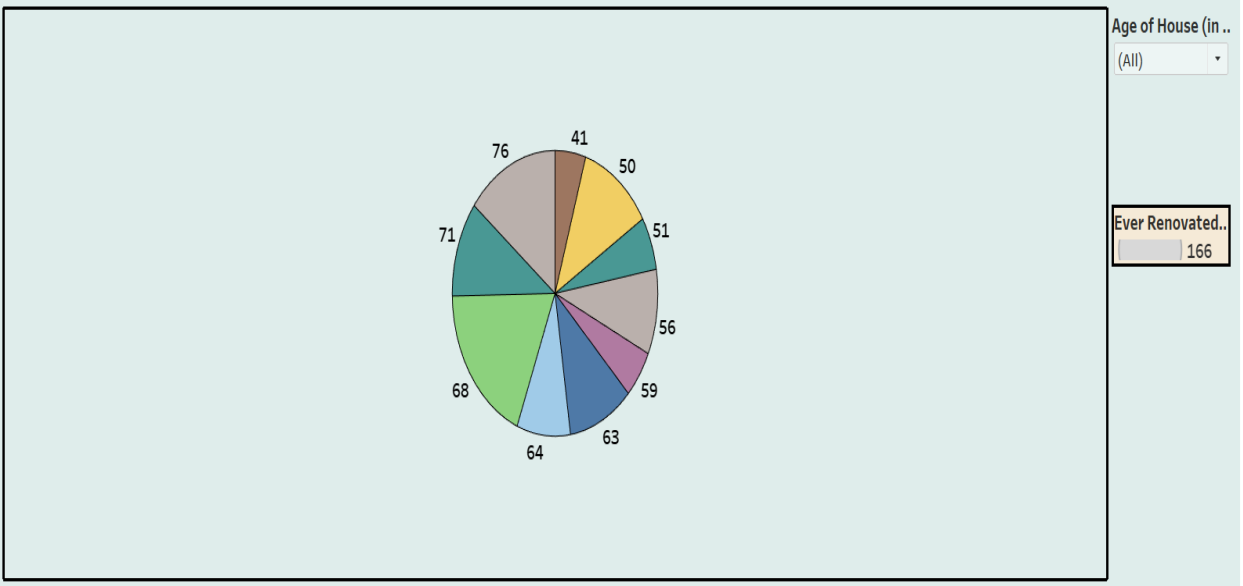| House age distribution is more influenced by the number of bedrooms compared to bathrooms and floors	The age of house varies based on their renovation status, providing a comprehensive overview	The importance of recent renovations in boosting property sales

Story 1

House age distribution is more influenced by the number of bedrooms compared to bathrooms and floors	The age of house varies based on their renovation status, providing a comprehensive overview	The importance of recent renovations in boosting property sales

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Story 1

Years Since Ren..
0 — 107

Bar chart of Sale Price (bin):

- 240K: 5.25M
- 260K: 11.65M
- 280K: (12.23M)
- 300K: 12.23M
- 320K: 23.90M
- 340K: 11.25M
- 360K: 19.42M
- 380K: 19.42M
- 400K: 21.91M
- 420K: 27.07M
- 440K: 7.60M
- 460K: 8.00M
- 500K: 11.55M
- 520K: 12.10M
- 540K: 6.90M
- 580K: 6.60M
- 660K: 8.45M
- 680K: 6.30M

Sale Price (bin)
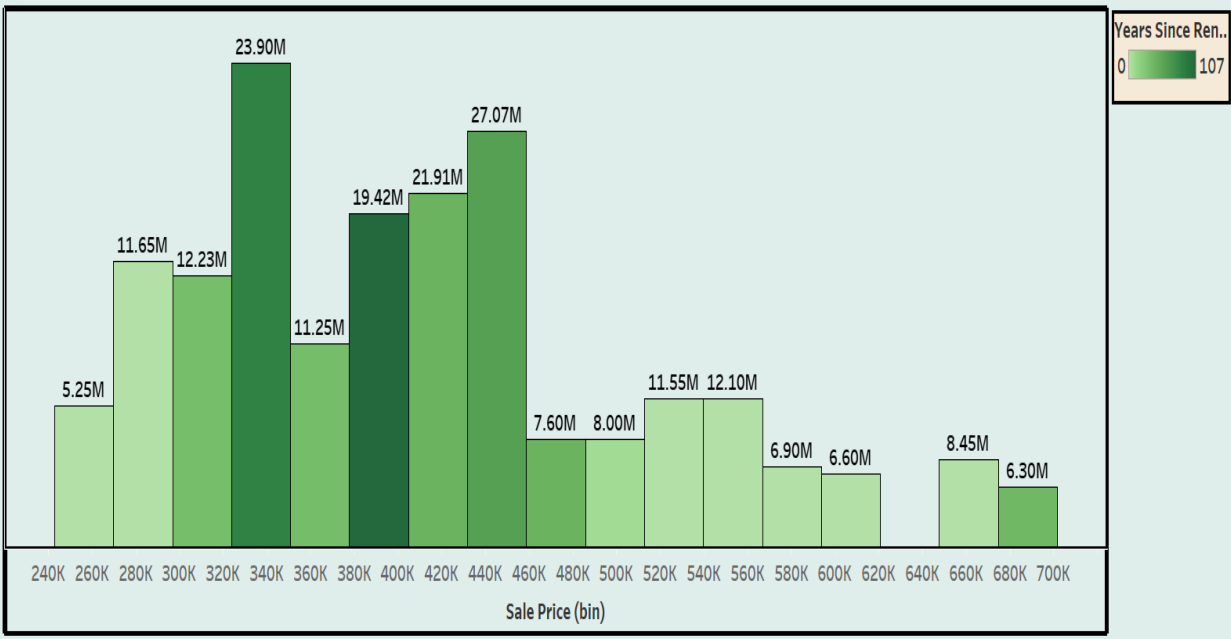
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- **ADVANTAGES**:

  o **User-Friendly Dashboards:** Intuitive interface with dark-themed visuals that reduce eye strain and enhance readability.

  o **Interactive Insights:** Real-time filtering and data slicing allow users to extract exactly what they need without manual intervention.

  o **Reusable Framework:** The dashboard model can be reused for other smartphone brands or markets by simply updating the dataset.

o   **Data-Driven Decision Making:** Helps strategists, marketers, and executives make smarter, evidence-based decisions.

o   **Time-Saving:** Reduces the manual workload for analysts by providing ready-to-explore visualizations.

- **DISADVANTAGES**:

o   **Platform Limitation:** Tableau Public may limit some functionality such as real-time backend connection and publishing privacy.

o   **Dependence on Data Accuracy:** Insights are only as good as the quality of input data; inaccurate or outdated datasets could mislead.

o   **Static Structure in Story:** While dashboards are interactive, Tableau stories have limited flexibility in dynamic narration.

9. CONCLUSION

In conclusion, the project **"Visualizing Housing Market Trends"** using **Tableau** successfully transforms complex housing data into meaningful, interactive, and user-friendly visual insights. By analyzing key factors such as **sale prices, property features, location**, and **time-based trends**, the visualization empowers users—including buyers, sellers, investors, and analysts—to make **informed decisions** based on **real-time data**.

10. FUTURE SCOPE

- Connect to live real estate APIs and databases for up-to-date visualizations
- Use advanced analytics (via Python/R integration) to predict future price trends
- Add detailed location data (zip codes, landmarks, schools) for better local analysis
- Create dashboards that adjust based on user preferences like budget or property type
- Design responsive dashboards and integrate voice assistants for on-the-go access
- Combine property data with social trends or user sentiment for richer insights

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11. APPENDIX

Dataset Link

https://www.kaggle.com/datasets/rituparnaghosh18/transformed-housing-data-2

GitHub & Project Demo Link

https://github.com/sudha11n2/Visualizing-Housing-Market-Trends