Visualizing Housing Market Trends: An Analysis of Sale Prices and Features using Tableau

1. INTRODUCTION

1.1 Project Overview:

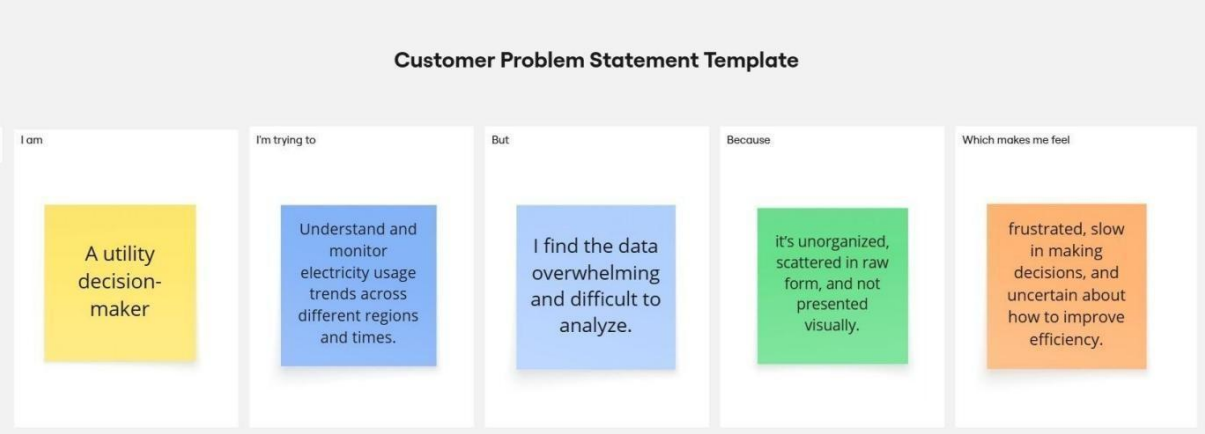
This project analyzes housing market trends by exploring property sale prices and key features such as renovations, bedrooms, bathrooms, and house age using Tableau. By leveraging interactive visualizations, it aims to simplify complex housing data and support strategic decision-making for real estate analysts, marketers, and company executives.

1.2 Purpose:

To visualize electricity consumption patterns and empower smarter, data-driven energy decisions for a sustainable future.

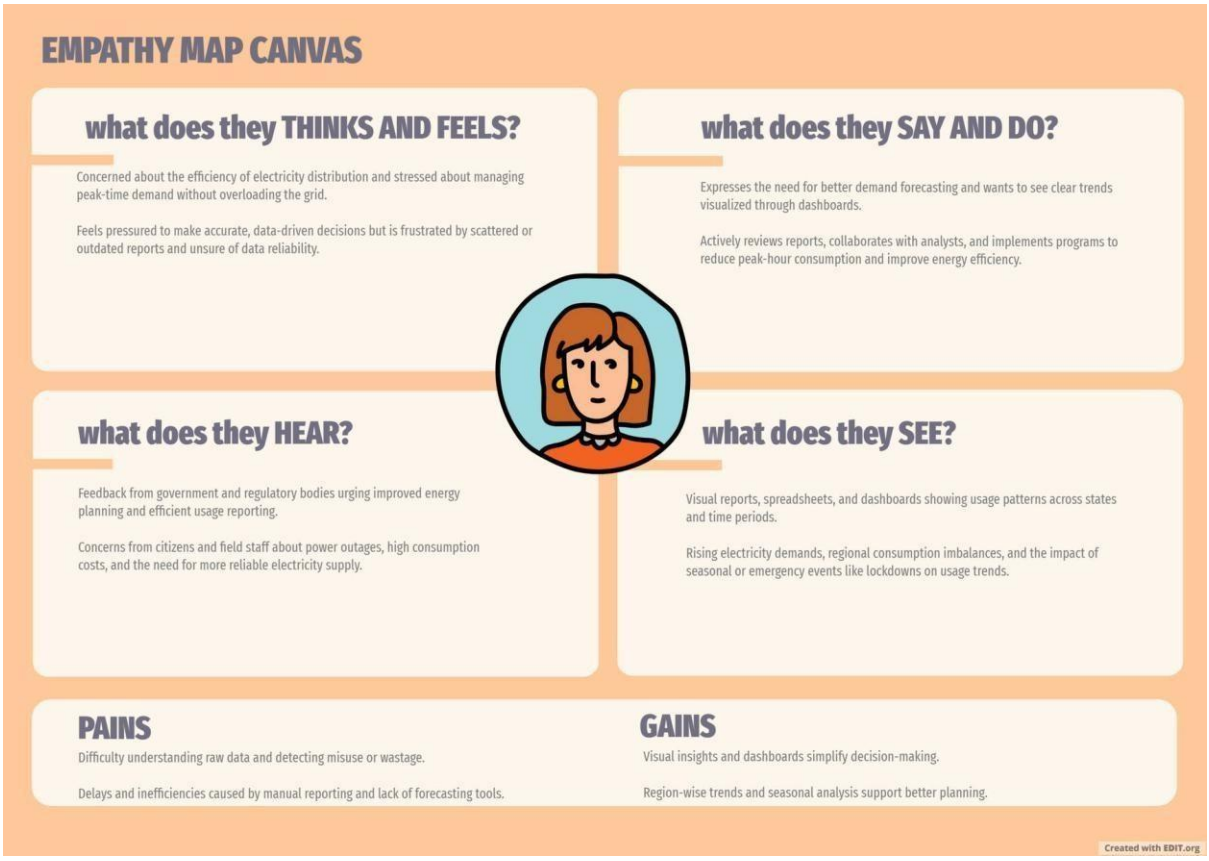
2. IDEATION PHASE

2.1 Problem Statement



Problem Statement(PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	A real estate analyst at ABC Company	identify factors affecting house prices and features	the dataset is large and hard to interpret	it lacks clear visualizations and segmentation	overwhelmed and unsure where to focus
PS-2	A marketing team member planning pricing strategies	understand sales trends by renovation and house features	data is spread across multiple tables with limited insights	it hasn't been structured for easy storytelling	confused and unable to create compelling campaigns

2.2 Empathy Map Canvas



2.3 Brainstorming

Idea	Idea Description	Group/Category
1	Show total records, average sale price, and total basement area	Time Patterns
2	Visualize total sales by years since renovation using histogram	Yearly Comparison
3	Pie chart of house age distribution by renovation status	Regional Insights
4	Bar chart showing house age vs. bathrooms, bedrooms, and floors	Event Impact (COVID)
5	Add calculated fields like average age and price difference	Visualization Techniques
6	Use filters for renovation status, age range, and price bands	Deployment / Web Integration
7	Use Tableau Story to explain renovation and price trends	Narrative & Communication
8	Show KPIs like avg. price (renovated vs. non-renovated), house area	Dashboard Interactivity
9	Publish and embed dashboard for internal/external sharing	Seasonal Analysis
10	Forecast price trends using historical data	Data Processing / KPIs

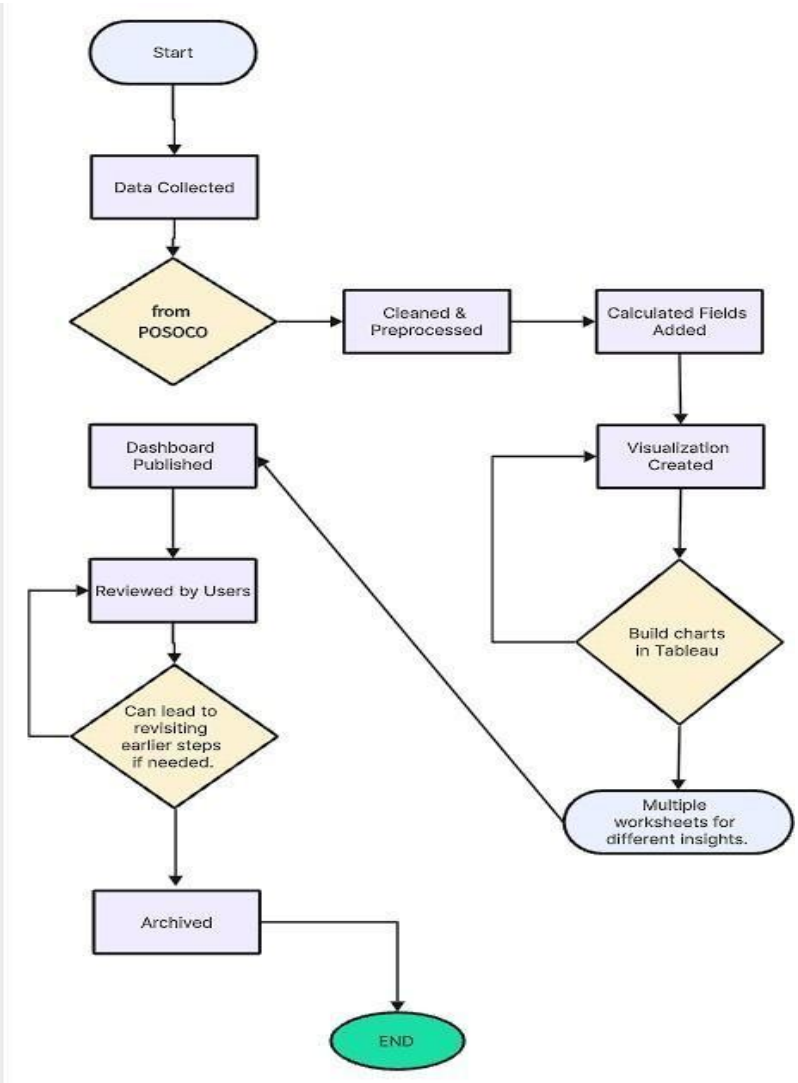
3. REQUIREMENT ANALYSIS

3.1 Customer Journey map

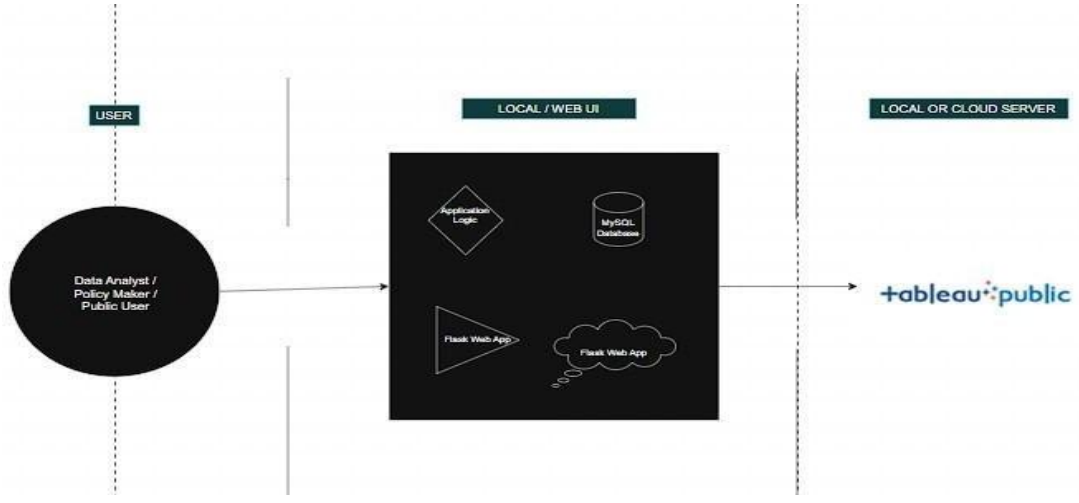
3.2 Solution Requirement

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIn
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Data Upload & Storage	Upload CSV File Store into MySQL Database
FR-4	Data Visualization	Create visualizations in Tableau Integrate with dashboard Age,year charts
FR-5	Dashboard Access	View interactive Tableau dashboard Use filters (Year, Region)
FR-6	Web Integration	Embed Tableau dashboard into Flask-based UI
FR-7	Insights & Reports	View data stories Access summary reports on usage patterns
FR No.	**Non-Functional Requirement**	**Description**
NFR-1	**Usability**	Interface should be intuitive and user-friendly for both technical and non-technical users
NFR-2	**Security**	Secure login with OTP/Email, protected data access
NFR-3	**Reliability**	System should consistently provide correct visualizations
NFR-4	**Performance**	Dashboards should load within 3–5 seconds even for larger datasets
NFR-5	**Availability**	The platform should be available 24/7 without major downtime
NFR-6	**Scalability**	Should support addition of new datasets and visualizations

3.3 Data Flow Diagram

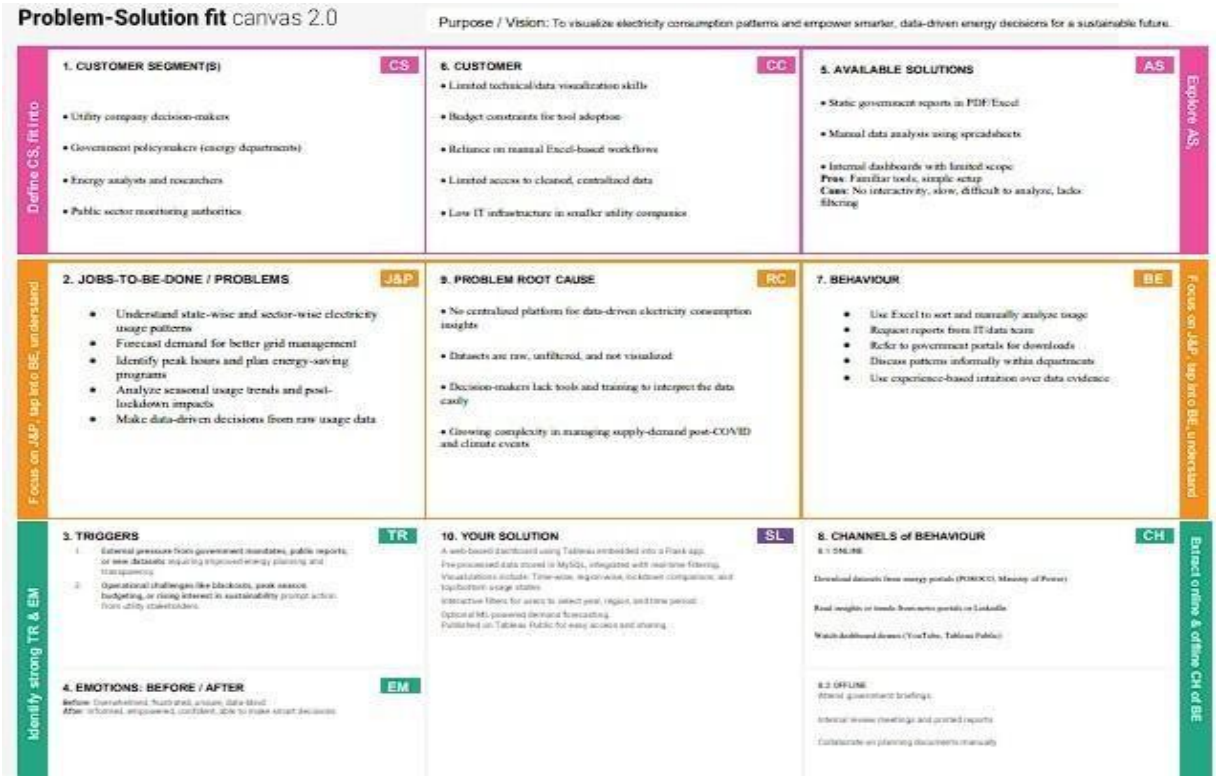


3.4 Technology Stack



4. PROJECT DESIGN

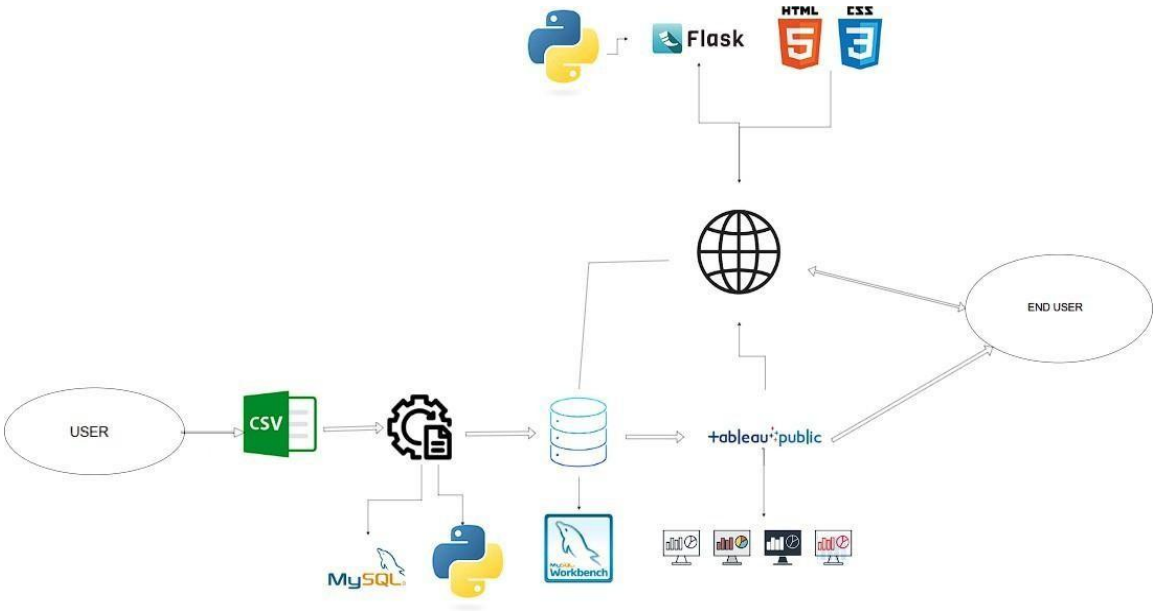
4.1 Problem Solution Fit



4.2 Proposed Solution

S.No.	Parameter	Description
1	**Problem Statement**	Understanding the housing market is challenging due to scattered and non-visual datasets. Real estate analysts and executives struggle to identify the factors affecting house prices and renovation trends, impacting pricing strategies and planning.
2	**Idea / Solution Description**	Our solution uses Tableau to transform raw housing sales data into insightful visual dashboards. The data is cleaned and filtered to highlight renovation age, number of rooms, and house features, enabling deeper analysis through charts like histograms and pie charts.
3	**Novelty / Uniqueness**	Unlike basic spreadsheets, this solution offers interactive, filter-driven visual exploration. It allows users to see correlations like price changes post-renovation, trends based on the number of bathrooms or floors, and patterns by house age.
4	**Social Impact / Customer Satisfaction**	The dashboard empowers real estate teams to make data-driven decisions, optimize pricing, and identify market trends. It brings clarity to complex data, supporting both business planning and strategic decision-making.
5	**Business Model (Revenue Model)**	This project can be extended as a decision-support tool for real estate firms. Value-added features like predictive pricing or renovation impact analysis can be monetized for clients and stakeholders.
6	**Scalability of the Solution**	The solution is scalable to other real estate markets by integrating regional housing datasets. It can be expanded to include new features, geographies, or predictive analytics

4.3 Solution Architecture



5. PROJECT PLANNING & SCHEDULING

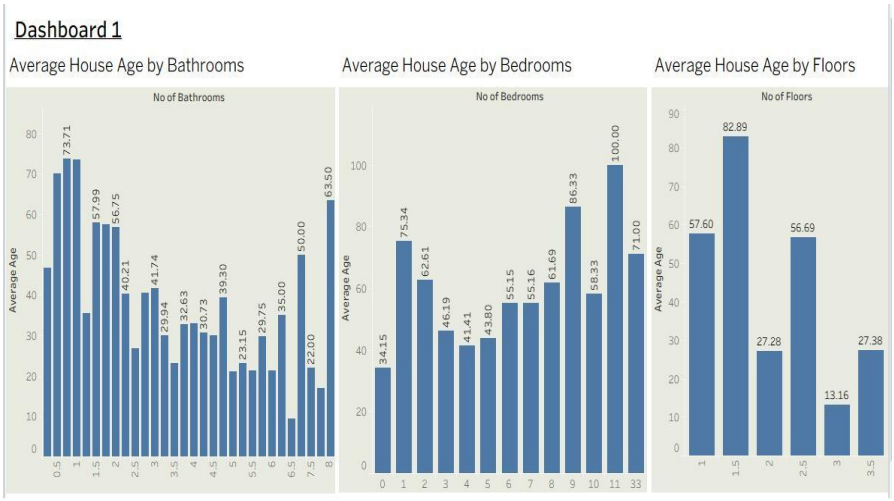
5.1 Project Planning

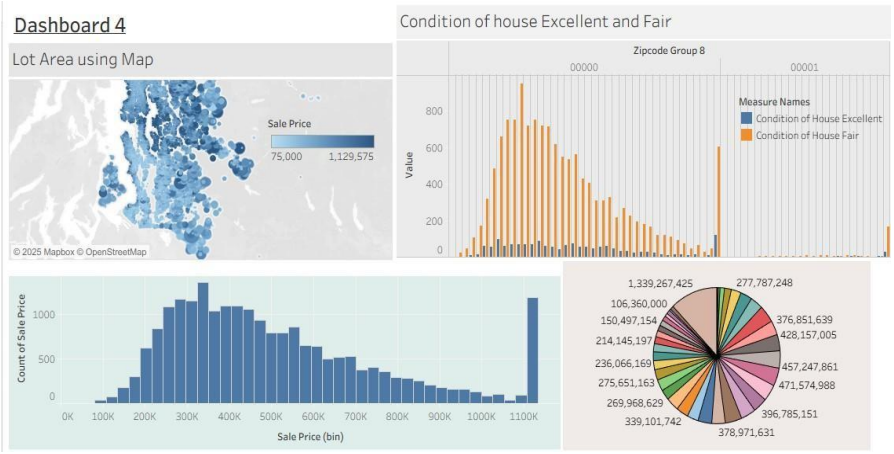
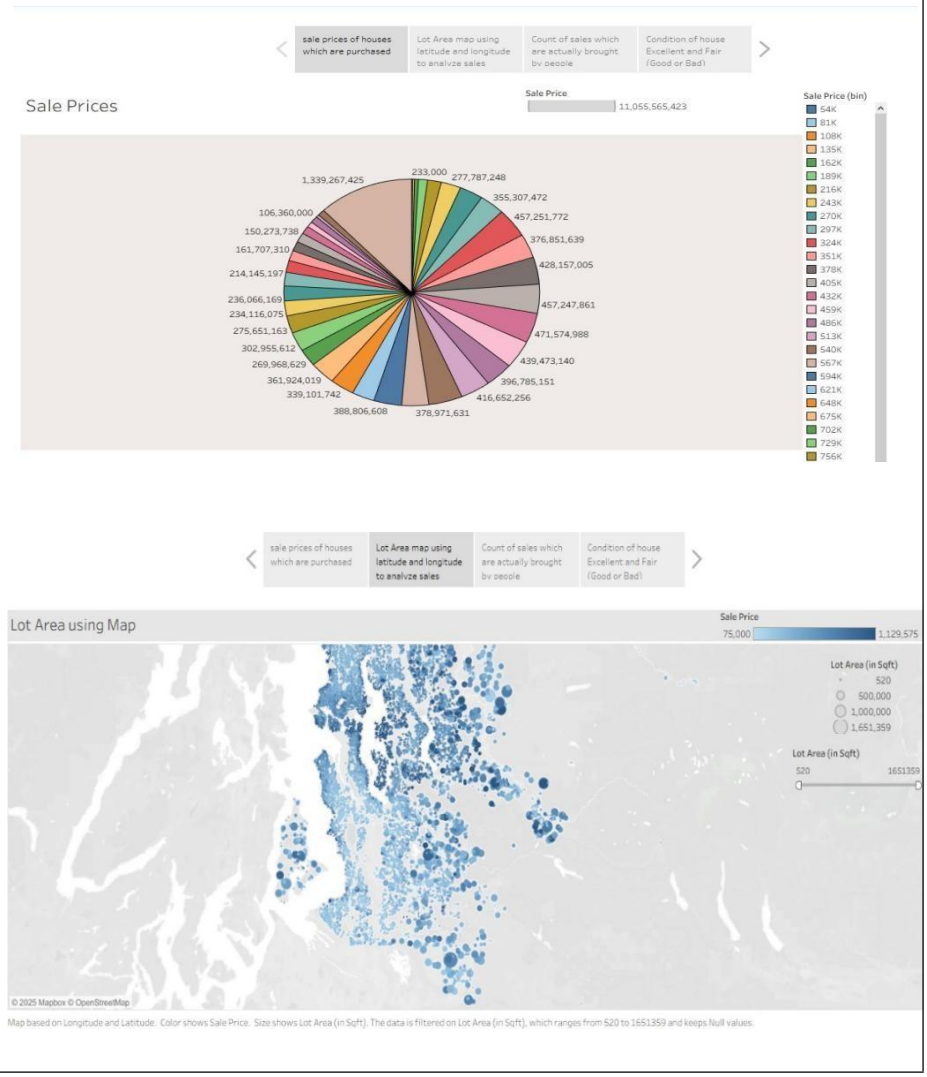
Sprint	Epic	User Story No.	User Story / Task	Points	Priority	Assigned To
Sprint-1	Registration	USN-1	As a user, I can register with my name and email	2	High	Nimmagadda Lakshman Kumar
Sprint-1	Upload CSV	USN-2	As a user, I can upload electricity data in CSV format	3	High	Koka Sarath Mahesh
Sprint-1	Data Cleaning	USN-3	As a developer, I can clean and preprocess uploaded data using Python	4	High	Nimmagadda Lakshman Kumar
Sprint-1	Database Storage	USN-4	As a developer, I can store cleaned data into MySQL	2	Low	Kollipara Venkata Sai Karthik
Sprint-2	Tableau Dashboard	USN-5	As a user, I can view dashboards generated using Tableau	5	High	Nidamanuri Sohith Kumar
Sprint-2	Web Integration	USN-6	As a user, I can access the dashboard via Flask UI	3	High	Nimmagadda Lakshman Kumar
Sprint-2	Add Filters	USN-7	As a user, I can filter the data by region, year, and quarter	2	Medium	Koka Sarath Mahesh
Sprint-3	Data Story	USN-8	As a user, I can view a Tableau Story with key electricity usage insights	2	Low	Nimmagadda Lakshman Kumar
Sprint-3	Forecasting	USN-9	As a developer, I can forecast usage using Prophet	3	Low	Nimmagadda Lakshman Kumar
Sprint-3	Documentation	USN-10	As a team, we can prepare final project documentation	2	Medium	Koka Sarath Mahesh
Sprint-4	Deployment	USN-11	As a developer, I can deploy the Flask app and publish the Tableau dashboard online	3	High	Nimmagadda Lakshman Kumar
Sprint-4	Demo Prep	USN-12	As a team, we can prepare a live demo walkthrough for stakeholders	2	Medium	Kollipara Venkata Sai Karthik
Sprint-4	Bug Fixing	USN-13	As a developer, I can test and fix UI/visual bugs from user feedback	2	Medium	Nidamanuri Sohith Kumar

6. FUNCTIONAL AND PERFORMANCE TESTING

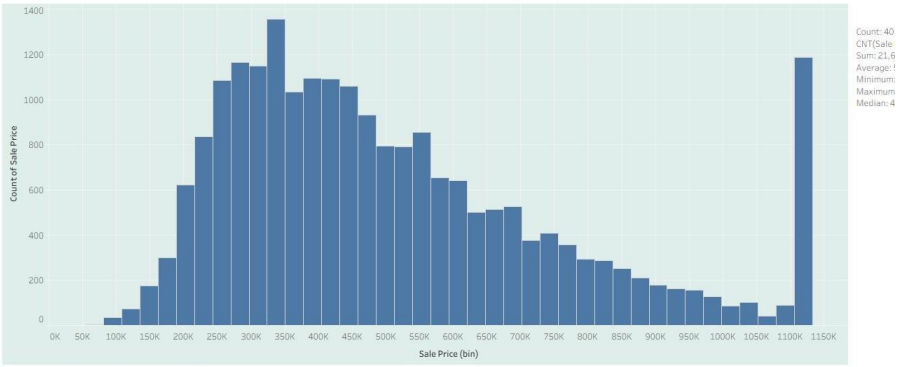
6.1 Performance Testing

S.No.	Parameter	Screenshot / Values
1.	Data Rendered	Dataset contains information about houses, including their price, area, number of bedrooms and bathrooms, and features like parking, furnishing status, and amenities, which can be used for real estate analysis in Tableau
2.	Data Preprocessing	Null values handled, filtered for required years. This was done using Python (Pandas) and stored in MySQL before importing into Tableau.
3.	Utilizationof Filters	Filters applied in dashboard: • **Region** • **State** • **Year** • **Quarter** • **Lockdown (Yes/No)** Used across all dashboards to enhance interactivity. | | 4 | **Calculated Fields Used** | Created fields in Tableau: • Year(Date) • Month(Date) • Quarter(Date) • Lockdown Label for categorizing data before and after lockdown. • Top N States (for usage comparison). | | 5 | **Dashboard Design** | **Number of Visualizations:** 3 Dashboards Each dashboard includes: • Line Chart (Monthly trends) • Bar Chart (State-wise comparison) • Map / Tree Map (Region-wise consumption) • KPI indicators (Total and Average Usage) R ef ̂erú: *Sc`reúenshotsof Dashboard.pdf* | | 6 | **Story Design** | **Number of Slides/Graphs in Story:** 15 Covers: • Intro & Problem • State-wise Usage • Lockdown Comparison

		• Regional Patterns • Seasonal Trends • Insights + Conclusion
5.	Dashboard design	No of Visualizations / Graphs - 3 Dashboards , 8 Visualizations / Graphs. 
		 

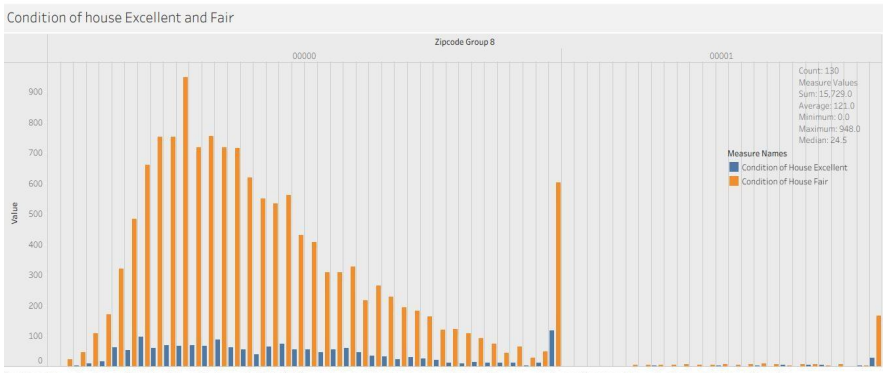
		
6	Story Design	No of Visualizations / Graphs -15 slides. 

sale prices of houses which are purchased | Lot Area map using latitude and longitude to analyze sales | **Count of sales which are actually brought by people** | Condition of house Excellent and Fair (Good or Bad)



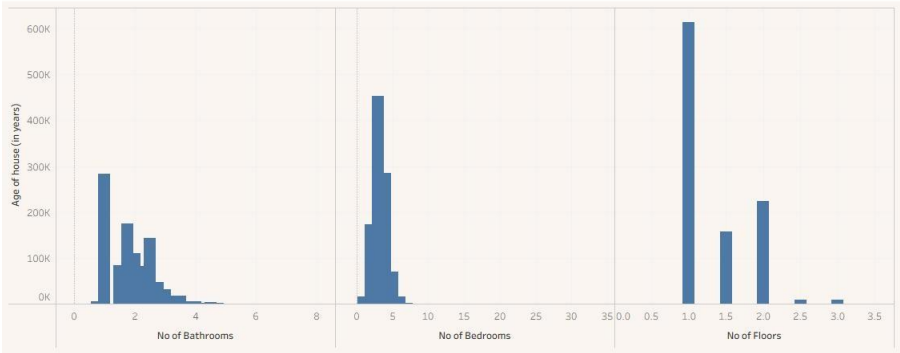
The trend of count of Sale Price for Sale Price (bin).

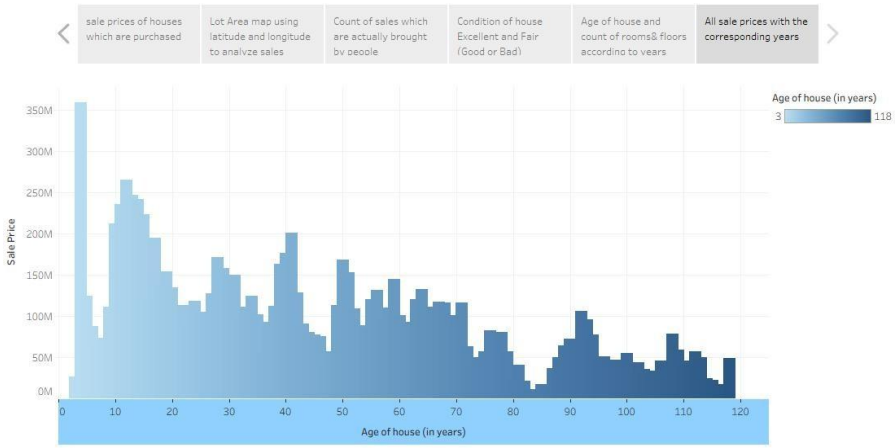
sale prices of houses which are purchased | Lot Area map using latitude and longitude to analyze sales | Count of sales which are actually brought by people | **Condition of house Excellent and Fair (Good or Bad)**

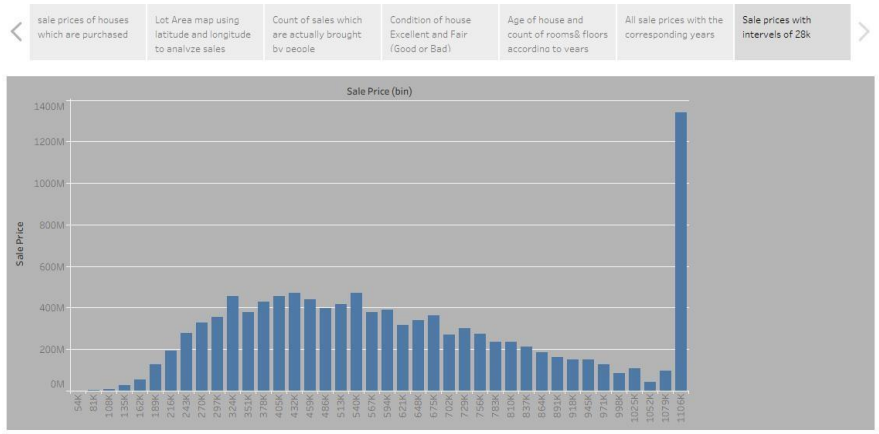


Condition of House Excellent and Condition of House Fair for each Sale Price (bin) as an attribute broken down by Zipcode Group 8. Color shows details about Condition of House Excellent and Condition of House Fair.

sale prices of houses which are purchased | Lot Area map using latitude and longitude to analyze sales | Count of sales which are actually brought by people | Condition of house Excellent and Fair (Good or Bad) | **Age of house and count of rooms& floors according to years** | All sale prices with the corresponding years

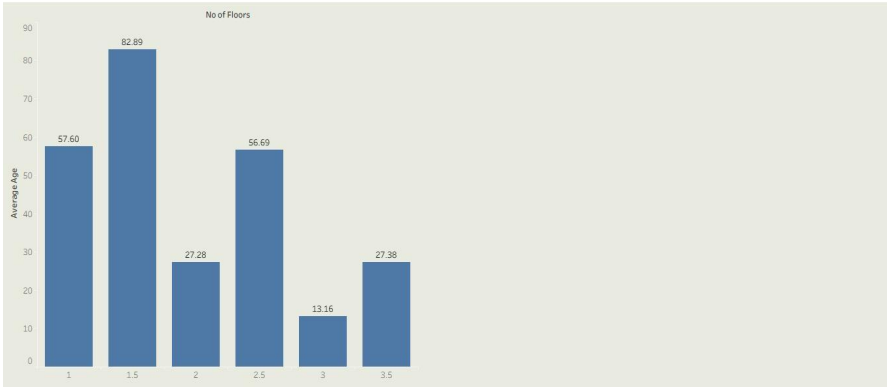



sale prices of houses which are purchased
Lot Area map using latitude and longitude to analyze sales
Count of sales which are actually brought by people
Condition of house Excellent and Fair (Good or Bad)
Age of house and count of rooms& floors according to years
All sale prices with the corresponding years
Age of house (in years)
3
118
Sale Price
350M
300M
250M
200M
150M
100M
50M
0M
0
10
20
30
40
50
60
70
80
90
100
110
120
Age of house (in years)

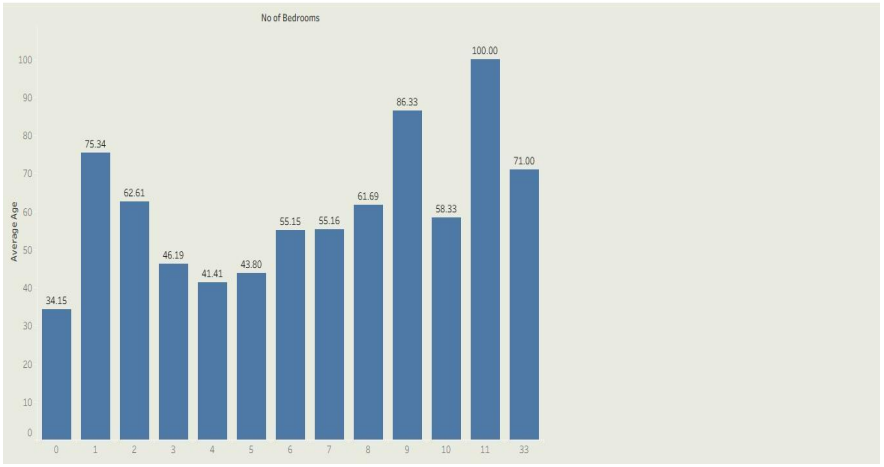

sale prices of houses which are purchased
Lot Area map using latitude and longitude to analyze sales
Count of sales which are actually brought by people
Condition of house Excellent and Fair (Good or Bad)
Age of house and count of rooms& floors according to years
All sale prices with the corresponding years
Sale prices with intervels of 28k
Sale Price (bin)
Sale Price
1400M
1200M
1000M
800M
600M
400M
200M
0M


Analyze total records , Average sale price & Total Basement Area
Average age of house by the count of Floors
Average age of house by the count of Bedrooms
Average age of house BY the count of Bathrooms
Showing years of renovation with the Sale price
concluding the house age with the count of house renovation
Line chart visualisation by Lot area (in Sqft) with rooms and floors
Total Records
21,609
Avg Sale Price
511,619
Total Basement Area
6,299,315

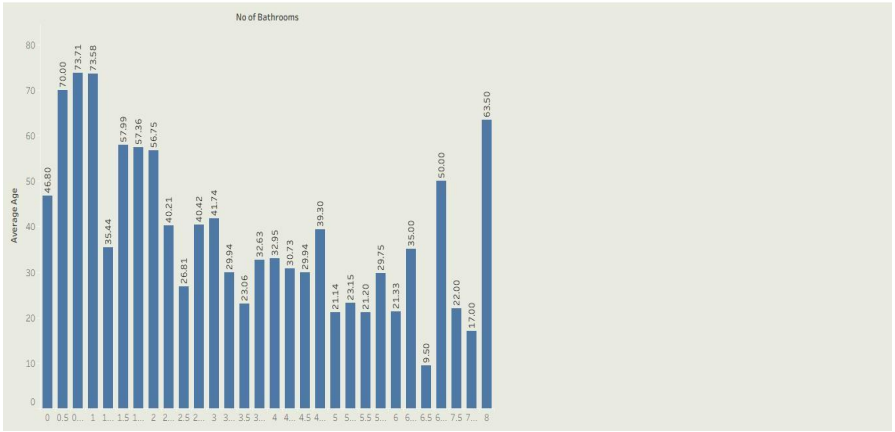
Analyze total records , Average sale price & Total Basement Area | **Average age of house by the count of Floors** | Average age of house by the count of Bedrooms | Average age of house BY the count of Bathrooms | Showing years of renovation with the Sale price | concluding the house age with the count of house renovation | Line chart visualisation by Lot area (in Sqft) with rooms and floors

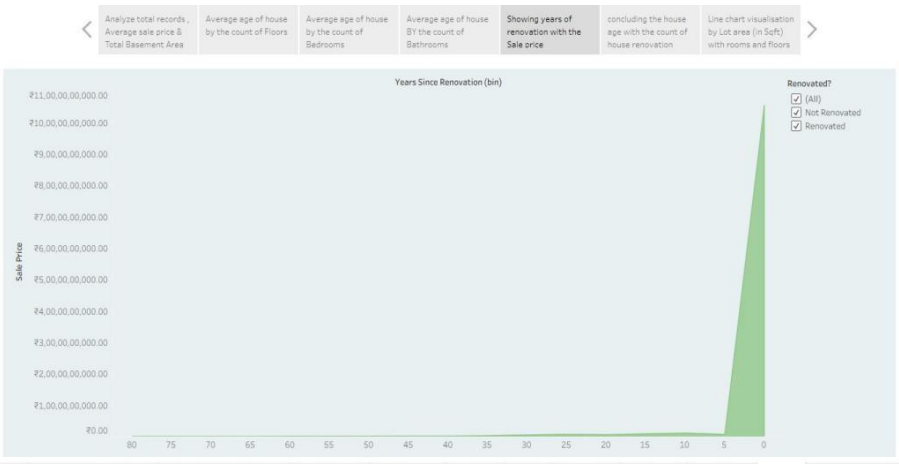


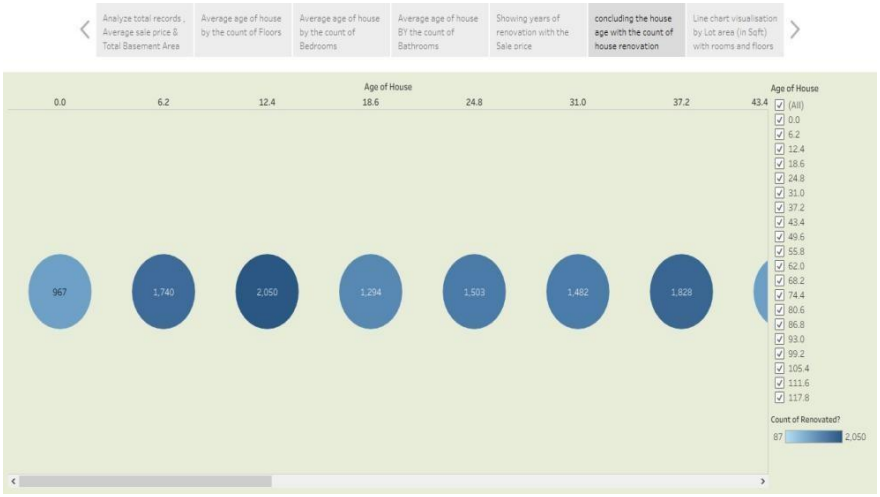
Analyze total records , Average sale price & Total Basement Area | Average age of house by the count of Floors | **Average age of house by the count of Bedrooms** | Average age of house BY the count of Bathrooms | Showing years of renovation with the Sale price | concluding the house age with the count of house renovation | Line chart visualisation by Lot area (in Sqft) with rooms and floors

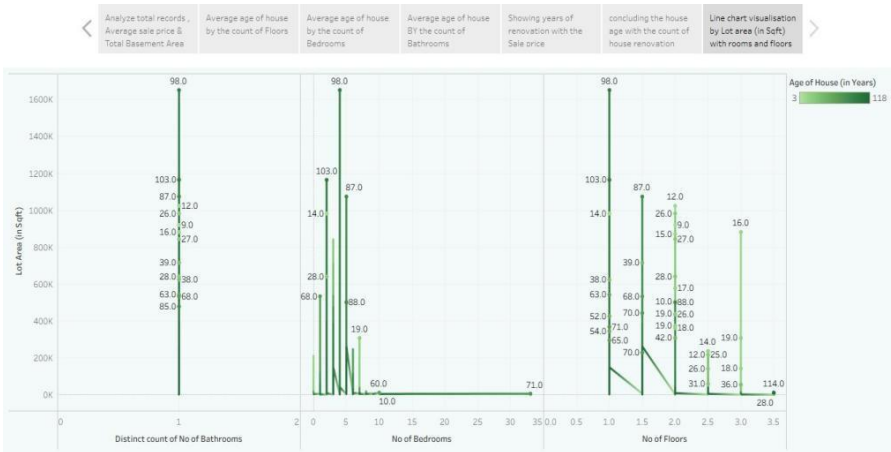


Analyze total records , Average sale price & Total Basement Area | Average age of house by the count of Floors | Average age of house by the count of Bedrooms | **Average age of house BY the count of Bathrooms** | Showing years of renovation with the Sale price | concluding the house age with the count of house renovation | Line chart visualisation by Lot area (in Sqft) with rooms and floors



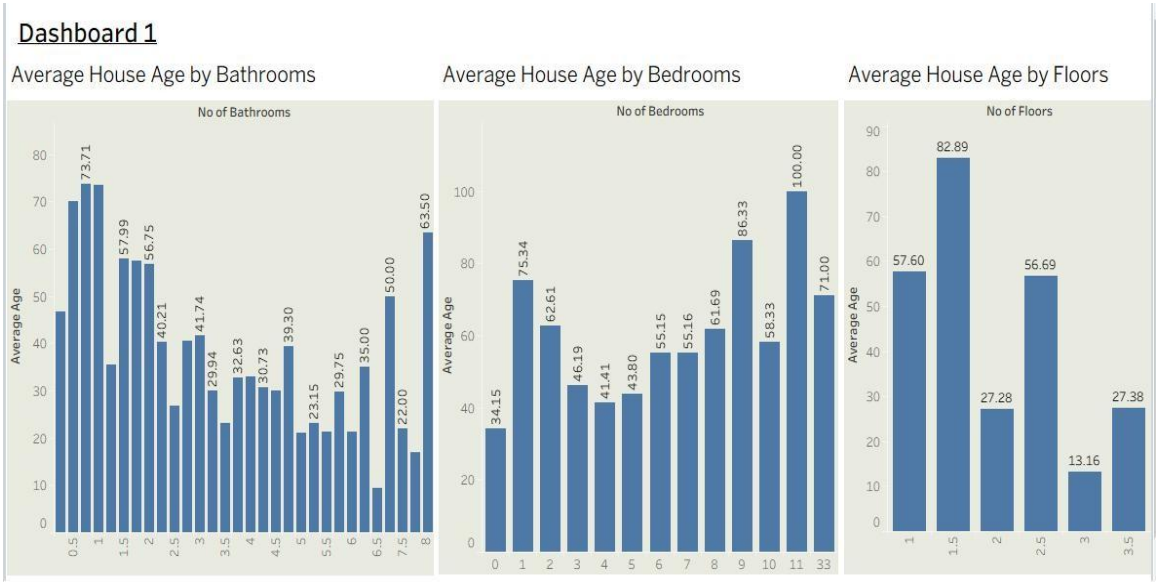

Analyze total records , Average sale price & Total Basement Area
Average age of house by the count of Floors
Average age of house by the count of Bedrooms
Average age of house BY the count of Bathrooms
Showing years of renovation with the Sale price
concluding the house age with the count of house renovation
Line chart visualisation by Lot area (in Sqft) with rooms and floors
Years Since Renovation (bin)
Renovated?
(All)
Not Renovated
Renovated
Sale Price
₹11,00,00,00,000.00
₹10,00,00,00,000.00
₹9,00,00,00,000.00
₹8,00,00,00,000.00
₹7,00,00,00,000.00
₹6,00,00,00,000.00
₹5,00,00,00,000.00
₹4,00,00,00,000.00
₹3,00,00,00,000.00
₹2,00,00,00,000.00
₹1,00,00,00,000.00
₹0.00
80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0

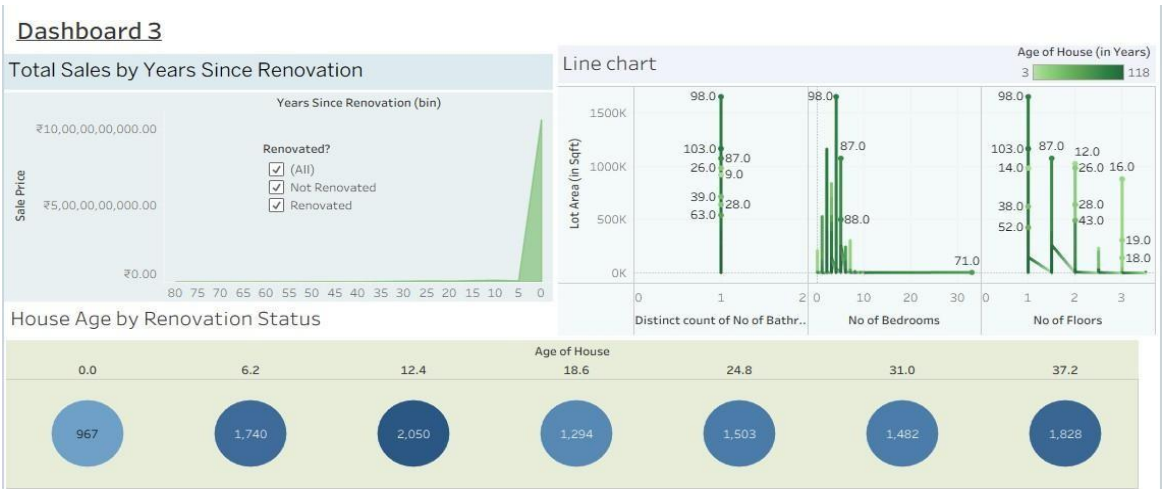

Analyze total records , Average sale price & Total Basement Area
Average age of house by the count of Floors
Average age of house by the count of Bedrooms
Average age of house BY the count of Bathrooms
Showing years of renovation with the Sale price
concluding the house age with the count of house renovation
Line chart visualisation by Lot area (in Sqft) with rooms and floors
Age of House
0.0 6.2 12.4 18.6 24.8 31.0 37.2 43.4
967
1,740
2,050
1,294
1,503
1,482
1,828
Age of House
(All)
0.0
6.2
12.4
18.6
24.8
31.0
37.2
43.4
49.6
55.8
62.0
68.2
74.4
80.6
86.8
93.0
99.2
105.4
111.6
117.8
Count of Renovated?
87
2,050

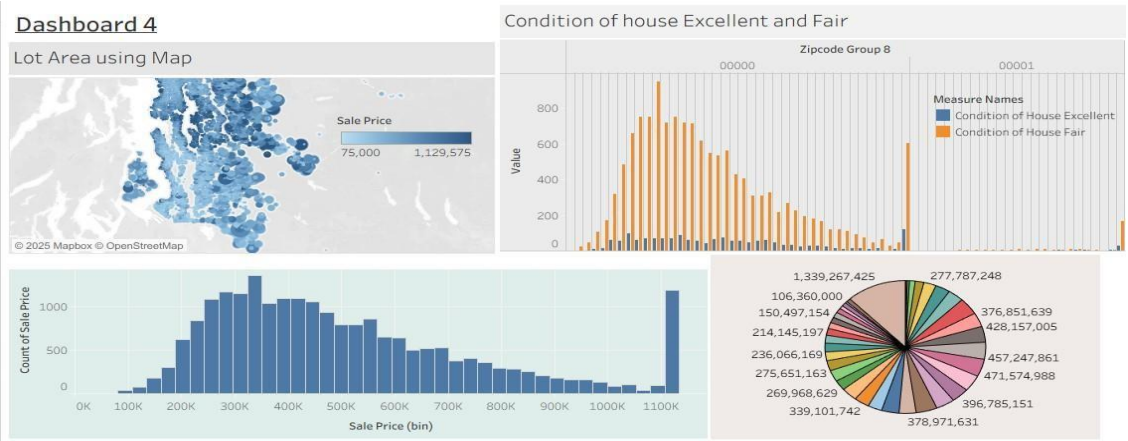

Analyze total records , Average sale price & Total Basement Area
Average age of house by the count of Floors
Average age of house by the count of Bedrooms
Average age of house BY the count of Bathrooms
Showing years of renovation with the Sale price
concluding the house age with the count of house renovation
Line chart visualisation by Lot area (in Sqft) with rooms and floors
Lot Area (in Sqft)
Age of House (in Years)
3
118
Distinct count of No of Bathrooms
No of Bedrooms
No of Floors

7. RESULTS

7.1 Output Screenshots







8. ADVANTAGES & DISADVANTAGES

Advantages	Disadvantages
Free, open-source technology stack	Depends on Tableau Public hosting
Visually rich dashboards with no coding	Manual data upload (not automated)
Easy to scale and reuse with other datasets	Limited customization in Tableau Public
Interactive filters and storytelling	Requires stable internet for live dashboards

9. CONCLUSION

The project successfully demonstrated how data visualization can transform complex housing sales data into actionable insights. Stakeholders can now make informed pricing and market decisions backed by clear trends in renovation impact, house features, and sales patterns..

10. FUTURE SCOPE

- Automate data updates from real estate listing platforms or Excel feeds
- Integrate predictive pricing models using machine learning
- Extend analysis to include rental trends and property tax insights
- Develop a mobile-responsive version of the dashboard for on-the-go analysis

11. APPENDIX

Source Code : NIL

Dataset link :

https://docs.google.com/spreadsheets/d/1Aeug2Xc6gim8fUmveDm8ZGi44t7MmWfr/edit?usp=drivesdk&ouid=113831785895254557512&rtpof=true&sd=true

Demovideo link :

https://drive.google.com/file/d/1heqHcFrQfN1AY7UYvLRYKz9KxODzcw_i/view?usp=sharing