

AI In Public Engagement

Case Competition, March 2, 2025

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GitHub Link: <https://github.com/anushashaikh2005/Team-16-DSMLC-Urban-Systems>

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Current Initiatives Taken by Urban Systems

Cochrane Water Supply Issues

- Supporting Cochrane to address water supply challenges
- Developed long-term strategy for reliable water access over the next 25 years.

Focus areas:

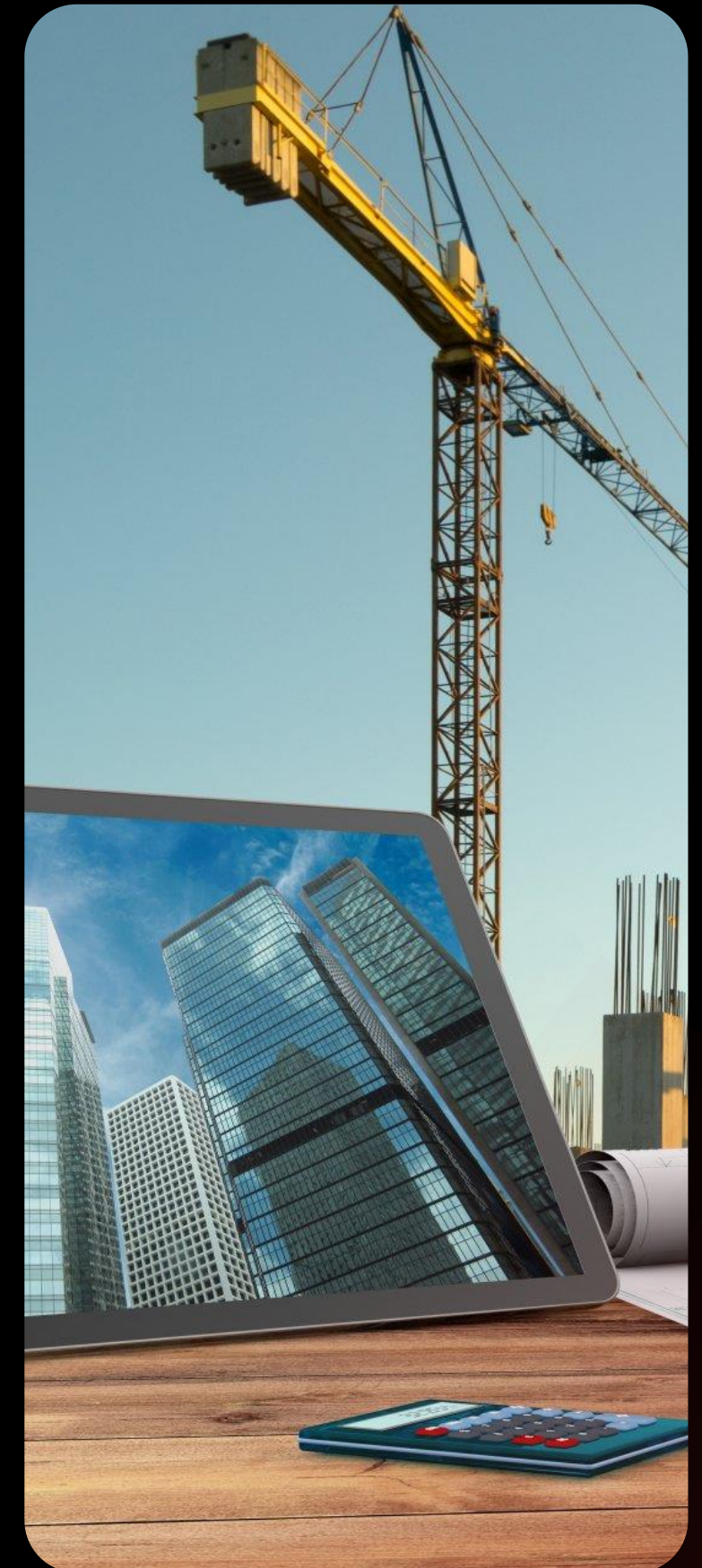
- Water demand management
- Infrastructure improvements
- Sustainable governance

Sustainable Landscaping

- Working with Indigenous communities to address climate change through sustainable energy solutions.
- Initiatives for cleaner energy.
- Develop cost-effective energy plans tailored to community needs.
- Built local capacity by training energy navigators to lead greener futures.

Housing Needs Assessment

- Assisted the Northern Village of Ile-a-la-Crosse in assessing housing needs.
- A community-wide survey was conducted to gather valuable data.
- The findings supported planning for both short- and long-term housing solutions.



Problem Statement

How can Urban System leverage artificial intelligence (AI) to prevent external bot manipulation of survey data while implementing Prototype A, K-Nearest Neighbors (KNN) model to prioritize and categorize manually reviewed responses, ensuring privacy, accuracy, security, and visualized survey insights through prototype B, user dashboard?

Solution Workflow

- Community fills survey (Google Form)
- Responses stored in Google Sheet / CSV
- CSV uploaded to KNN Model for filtering & classification
- Refined dataset uploaded into Power BI Dashboard
- Analysts explore insights
 - Trends, urgent concerns, informed decisions

Google Form Walkthrough

Survey Content

Urban Systems Community Development Survey

This anonymous survey is intended to get feedback from the community of the Northern Village of Ile-A-La-Crosse to help address issues that residents may face and collect data.

noorsy6161@gmail.com [Switch account](#)



* Indicates required question

Community Issues: potholes, icy roads, garbage disposal, animal control, etc.

Household Info: household size, dependents, residence type

Personal Info: age, Canadian status, living situation

Issue Details: duration of issue, whether it has been resolved

Link to Form: <https://forms.gle/j8etx165GMWasuhQA>

Google Sheets Responses

[illegible]

Training Data Set

	Issue	Priority	Household members	family_size	# of minors	Dependents	How old are you?	age_range	Duration of Issue (in months)	issue_duration	Has this issue been adressed before? Yes/No	Type of House	Canadian Status	Are you living alone?
0	Recreational Amenities	Low	1	small	0	No	26	Young Adult	11	Long Term	No	House	citizen	Yes
1	Garbage Disposal	High	7	large	4	Yes	53	Adult	6	Medium Term	Yes	Apartment	citizen	No
2	Recreational Amenities	Low	4	medium	0	No	34	Adult	5	Medium Term	Yes	Apartment	citizen	No
3	Recreational Amenities	Low	3	small	0	No	56	Adult	3	Short Term	No	Condo	work permit	No
4	Theft	High	3	small	2	Yes	66	Seniors	6	Medium Term	Yes	House	permanent resident	No
5	Construction	Moderate	8	large	1	Yes	58	Adult	2	Short Term	No	Rental	permanent resident	No
6	Theft	High	1	small	0	No	25	Young Adult	11	Long Term	No	Condo	citizen	Yes
7	Garbage Disposal	High	2	small	2	Yes	62	Seniors	5	Medium Term	Yes	Apartment	permanent resident	No
8	Amenities Nearby (eg.parks)	Moderate	3	small	1	Yes	62	Seniors	2	Short Term	Yes	House	citizen	No
9	Hailstorms	High	1	small	0	No	19	Young Adult	8	Medium Term	No	House	permanent resident	Yes
10	Icy Roads	Moderate	5	medium	5	Yes	46	Adult	11	Long Term	No	House	work permit	No
11	Hailstorms	High	3	small	1	Yes	41	Adult	6	Medium Term	Yes	Apartment	citizen	No
12	Amenities Nearby (eg.parks)	Moderate	7	large	5	Yes	23	Young Adult	9	Long Term	No	Rental	citizen	No
13	Homeless Nearby	Moderate	4	medium	2	Yes	64	Seniors	5	Medium Term	Yes	Condo	citizen	No

CSV File From Google Sheets

	Issue	Priority	Household	family_size	# of minors	Dependen	How old ar	age_range	Duration o	issue_dura	Has this is	Type of Ho	Canadian	Are you living alone?
0	Recreator	Low	5	medium	0	No	20	Young Adu	5	Medium Te	No	House	citizen	No
1	Theft	High	3	small	2	Yes	3	Young Adu	2	Short Term	Yes	Condo	work perm	No
2	Pot holes	Low	2	small	0	No	24	Young Adu	7	Medium Te	No	House	citizen	Yes
3	Icy Roads	Moderate	3	small	1	Yes	23	Young Adu	2	Short Term	No	House	citizen	No
4	Theft	High	4	medium	2	Yes	37	Adult	7	Medium Te	No	House	citizen	No
5	Recreator	Low	5	medium	0	No	19	Young Adu	5	Medium Te	No	Apartment	citizen	No

KNN Classification

```
X_train = nl.transform(dfX_train.to_numpy())
```

```
#Part c: Build the machine learning model using knn-classifier, we used a k-value of 15
```

```
knn = KNeighborsClassifier(n_neighbors=15)
```

```
knn.fit(X_train, y_train)
```

```
y_test = le.transform(sy_test.to_numpy())
```

```
X_test = nl.transform(dfX_test.to_numpy())
```

```
knn.predict(X_test)
```

```
knn.score(X_test, y_test)
```

```
#Will then predict the new_instance class using the knn transformation
```

```
if new_instance is not None:
```

```
    # Ensure the new instance has the same structure as the training data
```

```
    new_instance_scaled = nl.transform(new_instance) # Scale the new instance
```

```
    new_instance_class = knn.predict(new_instance_scaled) # Predict the class of the new instance
```

```
    new_instance_class = le.inverse_transform(new_instance_class) # Convert numeric label back to original class
```

```
    return new_instance_class # Return the predicted class of the new instance
```

Prediction Function

```
def prediction(Class_Name, urban_test, new_instance):
```

```
    #Import the different packages
```

```
    from sklearn.model_selection import train_test_split
```

```
    from sklearn import preprocessing
```

```
    from sklearn.neighbors import KNeighborsClassifier
```

```
    dfX = urban_test.drop (columns = [Class_Name])
```

```
    sy = urban_test[Class_Name]
```

```
    #Part a: Dividing the data into the training set and test set
```

```
    dfX_train, dfX_test, sy_train, sy_test = train_test_split(dfX,sy)
```

```
    dfX_train, dfX_test, sy_train, sy_test;
```

```
    #Preprocessing encoder
```

```
    le = preprocessing.LabelEncoder()
```

```
    le = le.fit(sy_train)
```

```
    #Transformed training sets
```

```
    y_train = le.transform(sy_train)
```

```
    sy_train, y_train
```

```
    dfX_train.to_numpy()
```

```
    #using the MinMaxScaler from the classifiers
```

```
    nl = preprocessing.MinMaxScaler()
```

```
    nl = nl.fit(dfX_train.to_numpy())
```

Prototype A – KNN

AI Model Selection

We chose the K-Nearest Neighbors (KNN) classifier to address survey data manipulation and enhance prediction accuracy.



Dataset Creation

A theoretical dataset of 500 survey responses was designed, reflecting data similar to the Housing Needs Assessment.



Data Formating

The dataset was structured into a pandas dataframe for efficient analysis and model training.



Categories Classified

Household Members
Number of Minors
Age
Type of House
Duration of Issue
Type of House
Canadian Status



Issue Priorities

High priority: Drainage, Theft, Garbage Disposal
Medium priority: Amenities Nearby, Icy Roads, Transportation
Low priority: Less critical issues



Purpose

This classification process allows Urban Systems to prioritize and focus on the most relevant and significant data.



Benefits & Outcomes of K-Nearest Neighbors (KNN)

Data Sharing Potential

Improved Data Accuracy

Scalable Solutions

Descion Making

Efficient

Enhanced Secuirty

SWOT Analysis – KNN Model



Strengths

- Efficient Data Processing
- Enhanced Decision-Making
- Improved Data Accuracy
- Security & Privacy



Weaknesses

- Data Dependency
- Context Limitations
- Resource Intensity



Opportunities

- Scalability
- Advanced AI Integration
- Continuous Improvement
- Broader Application
- Data Sharing & Collaboration



Threats

- Data Bias & Misclassification
- Security Risks
- Adoption Challenges
- Regulations

Prototype B – User Dash Board

AI Model Selection

We developed an interactive dashboard to visualize AI-processed survey data and support data-driven decision-making.



Community Mapping

Highlights the geographical distribution of survey responses, allowing analysts to understand where concerns are most concentrated.



Resolution Status Pie Chart

Indicates whether an issue has been addressed or still requires a solution.



Impact Analysis Chart

Displays the number of people affected by each issue.



Issue Prioritization

Categorizes survey-identified issues as high, medium, or low priority and displays the duration of the issue (in months).

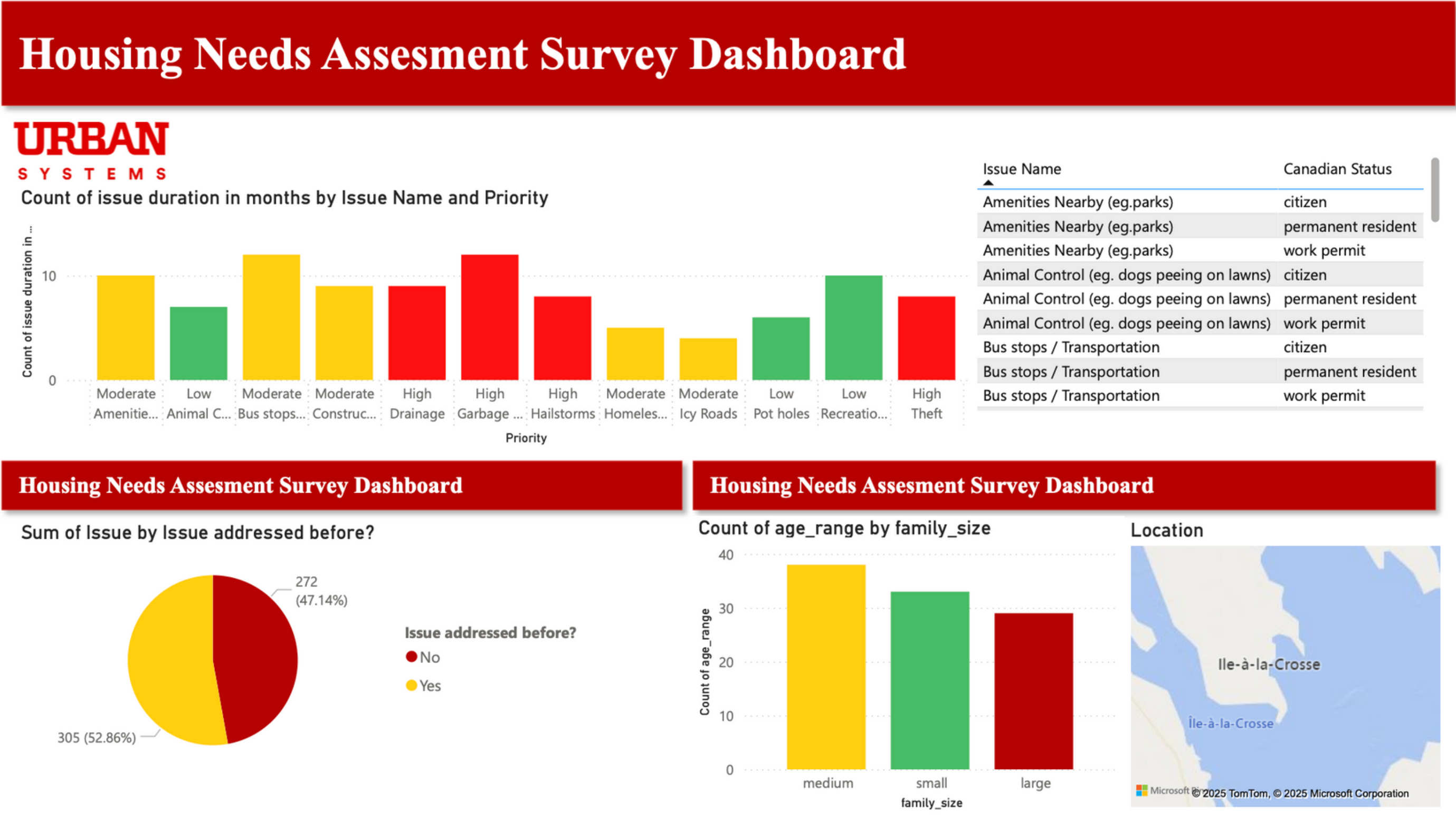


Purpose

The dashboard provides analysts at Urban Systems with an interactive visualization of AI-processed survey data, helping identify key trends, and insights for post-survey analysis and decision-making.



Prototype B – User Dash Board



Benefits & Outcomes of User Dash Board

Improved Data Visualization

Enhanced descision making

Scalable Solutions

Geospacial Awareness

Issue Prioritization Understanding

SWOT Analysis – User Dash Board



Strengths

- Comprehensive Data Visualization
- AI-Powered Analysis
- User-Friendly Interface
- Data-Driven Decision Making



Weaknesses

- Dependence on Prototype A
- Limited Real-Time Updates
- Potential Learning Curve



Opportunities

- Scalability
- Integration with Other Data Sources
- Enhanced AI Features



Threats

- Data Privacy & Security Risks
- User Adoption Challenges
- Inaccurate Data Interpretation

Feasibility

Time Efficient

Digital surveys and automated AI classification speed up data collection and decision-making.

KNN automates data processing, reducing manual effort and accelerating results.

Reduced Labor Costs

The solution reduces the need for extensive manual labor in sorting and interpreting survey data.

Fewer staff are required for data management, saving on labor costs.

Accuracy & Consistency

AI reduces human error and ensures consistent, reliable data classification.

Automated analysis enhances transparency and trust in the results.

Conclusion

Streamline data processing and reduce manual effort. Improve accuracy and minimize human error. Support Urban Systems in making data-driven decisions for better community planning and housing solutions.

Thank You