Urban Digital Memory

Leveraging social media data on public spaces to inform urban design processes

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MSc Urbanism Graduation
Thesis Defence



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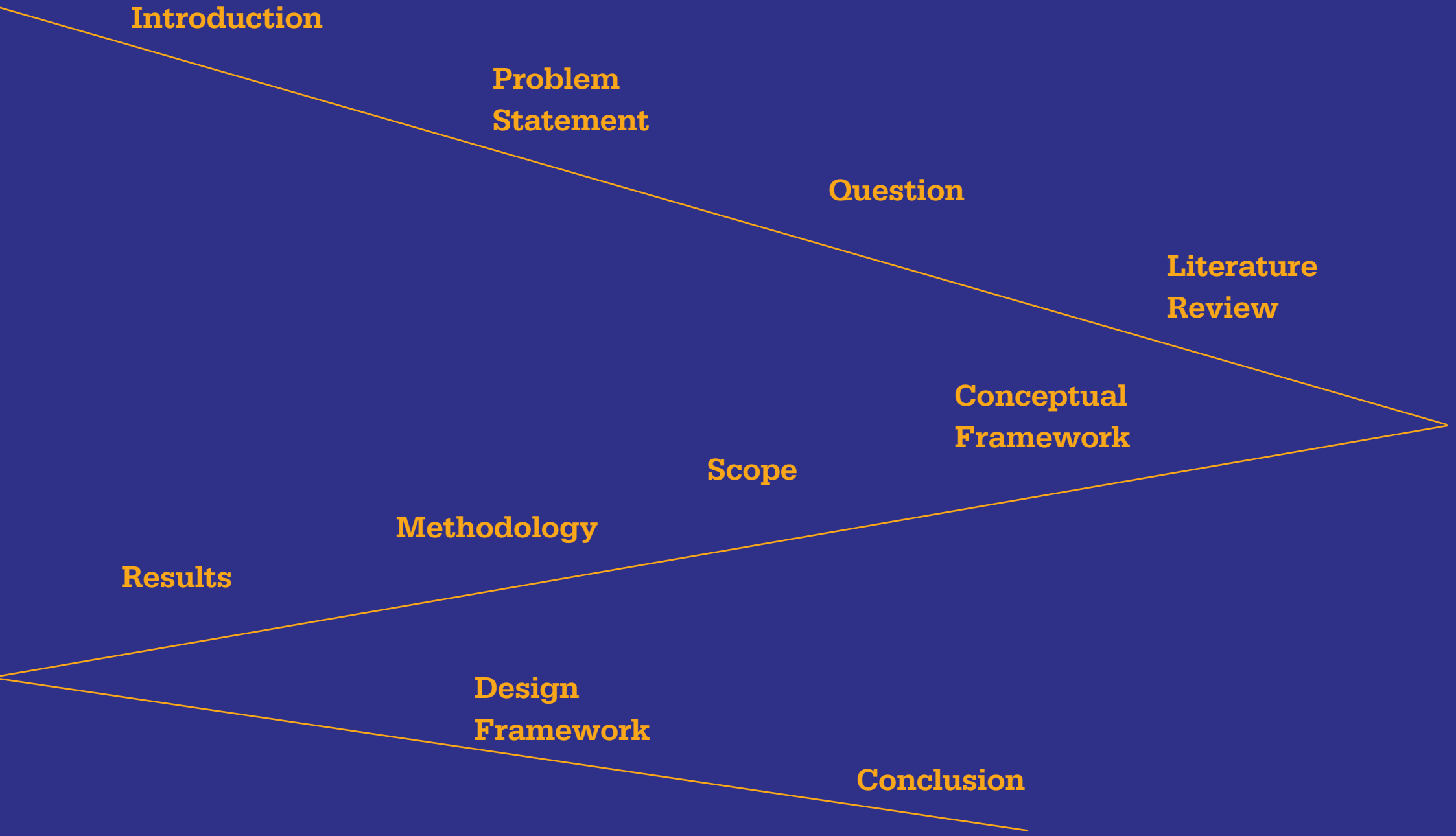
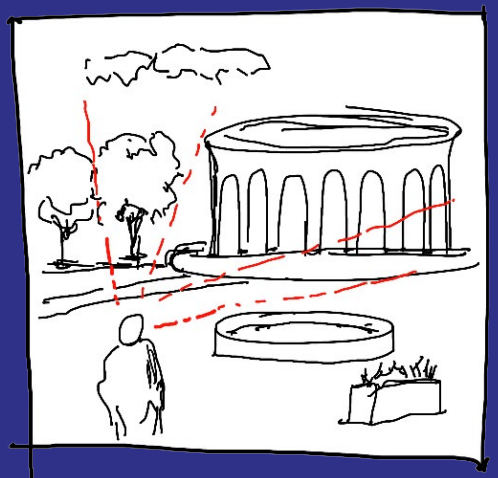
AUBS - Urbanism graduation
A4 Presentation, 2025-26
BK, TU Delft

Overview

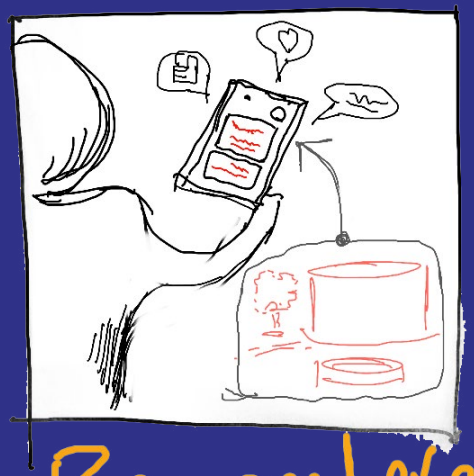

Introduction
Problem Statement
Question
Literature Review
Conceptual Framework
Scope
Methodology
Results
Design Framework
Conclusion

Introduction

What is Digital Memory?



Space



Remembered Space



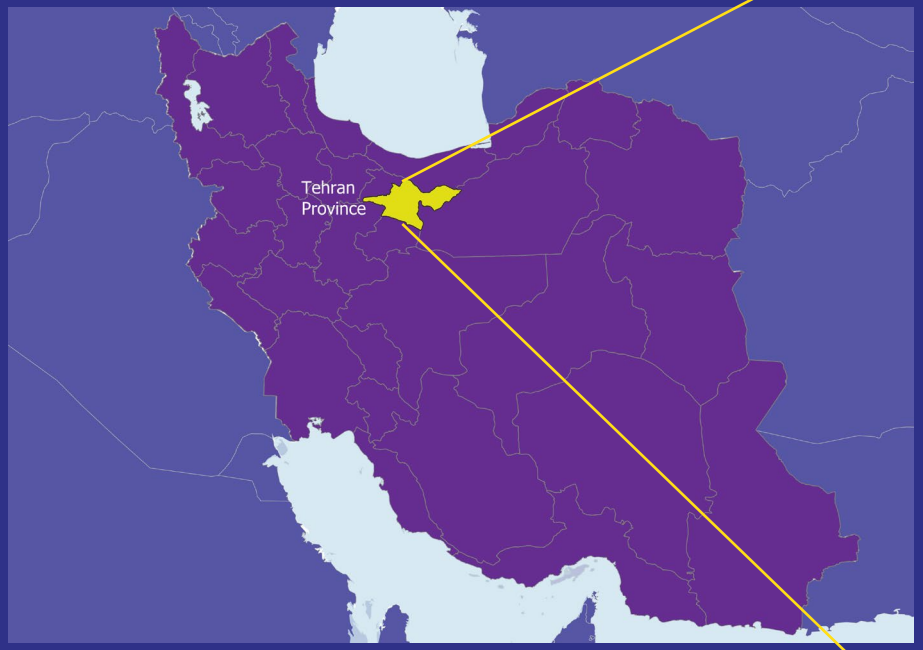
Perceived Space



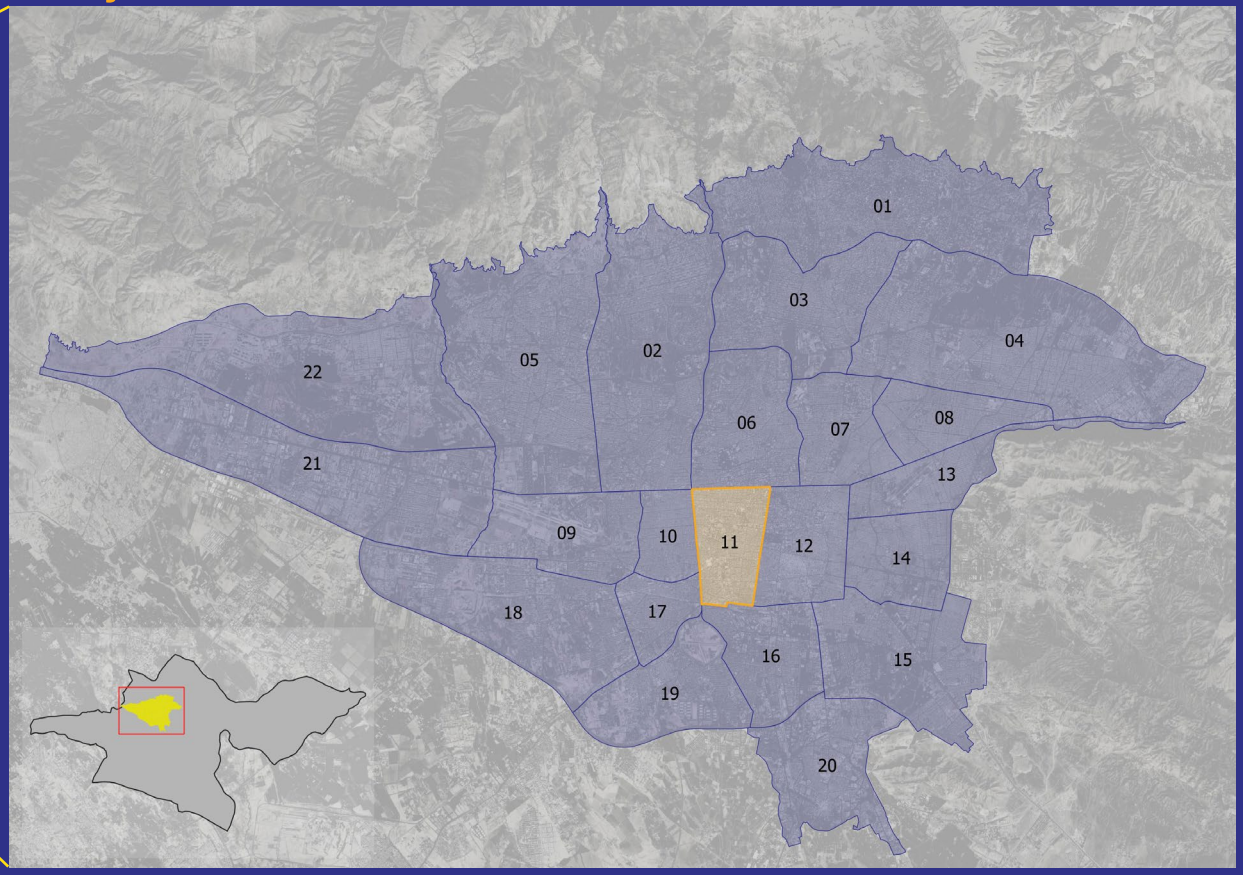
Digital (shared) Space

Introduction

Tehran in Iran

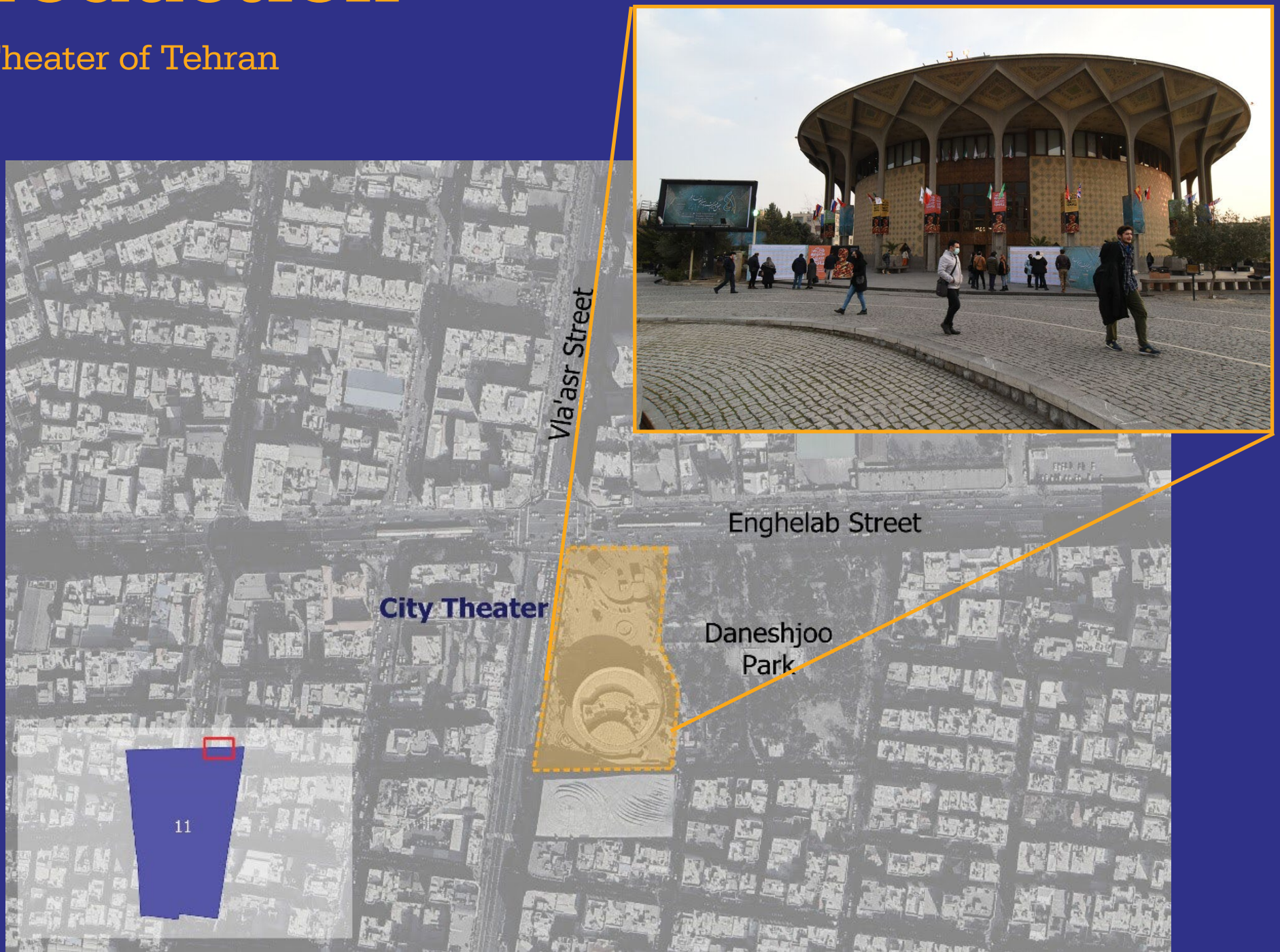


City of Tehran



Introduction

City Theater of Tehran



Introduction

City Theater of Tehran, 1970s





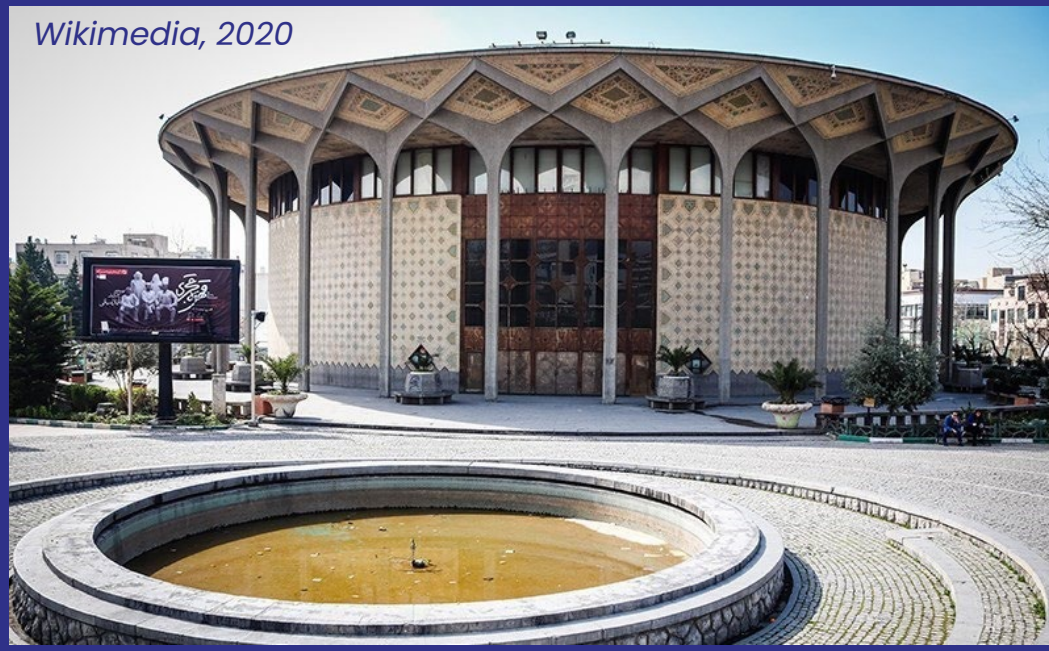
Wikimedia, 2006

Ehsanrostamipour, 2023

Introduction

City Theater of Tehran, Present


Wikimedia, 2006


Wikimedia, 2020


Wikimedia, 2015

Oops!

Redesign and reconstruction in 2024









"...in recent years, the sancity of the City Theater has repeatedly been violated..."

The Tehran City Theater's pool has been [illegible] buried under soil.

The City Theater, which opened in 1972, is a symbol of modern Iranian culture, but in recent years, the sanctity of the City Theater has repeatedly been violated in various ways by the Tehran Municipality.

"Stop fencing around the Ctiy Theater!"

Stop fencing around the City Theater!

Following the unveiling of the fencing plan around the City Theater by the Minister of Culture and Islamic Guidance, a campaign has been launched to halt the restriction of the City Theater's premises by erecting walls around it.
To sign, take action via the link below:





"This filthy mess... who knows when it's ever going to get cleaned up!?"

This filthy mess that the sledgehammer-wielding minister from the previous government and his picture-frame buddies stirred up at the City Theater; who knows when it's ever going to get cleaned up!?

***"The Shahr Theater building, vibrant yesterday, ruined today!
Is the #Tehran City Councel awake?"***

The [illegible] vibrant yesterday, has turned into ruins today!
Is the #Tehran City Council awake?
Is the #Tehran Cultural Heritage Administration awake?
Is the Cultural Commission of #Parliament awake?
What explanation exists for this #destruction, and what explanation for the silence and inaction of the Tehran Province Cultural Heritage Administration?

"Despite widespread protests against the fencing plan..., they've sealed off the entire complex to implement a plan whose details are still unclear."

They've blocked off around Theater City for fencing!

Despite widespread protests against the fencing plan for Theater City, they've sealed off the entire complex to implement a plan whose details are still unclear.
-The images are from today. I saw them in a news group but couldn't find the photographer.

Problem Statement









Stop fencing around the City Theater!

Following the unveiling of the fencing plan around the City Theater by the Minister of Culture and Islamic Guidance, a campaign has been launched to halt the restriction of the City Theater's premises by erecting walls around it.
To sign, take action via the link below:

The Tehran City Theater's pool has been completely buried under soil.

The City Theater, which opened in 1972, is a symbol of modern Iranian culture, but in recent years, the sanctity of the City Theater has repeatedly been violated in various ways by the Tehran Municipality.

Spatial memories are valuable insights into a space that are taken for granted by designers/decision-makers in their interventions, leading to the erasure of public space.

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Is the #Tehran City Council awake?
Is the #Tehran Cultural Heritage Administration awake?
Is the Cultural Commission of #Parliament awake?
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-The images are from today. I saw them in a news group but couldn't find the photographer.

Big Question

How can digital memories shared by citizens help identify spatial values as potential conditions for interventions in Tehran's public spaces and the City Theater square?

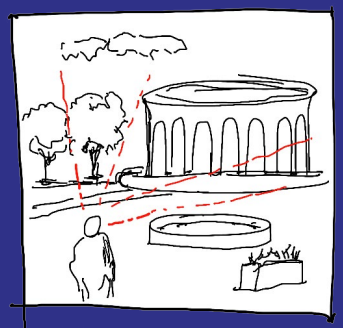
Too BIG!

Let's start with smaller Questions

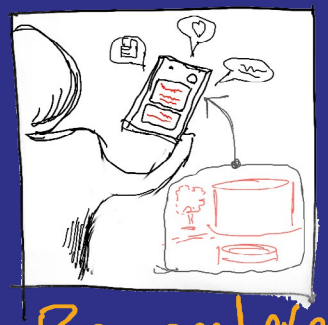
*1. How do digital memories **narrate the lived experiences of citizens** on **X** (formerly Twitter)?*

*2. What **emotions** can be **traced** from digital memories of the City Theater?*

Literature Review



Space



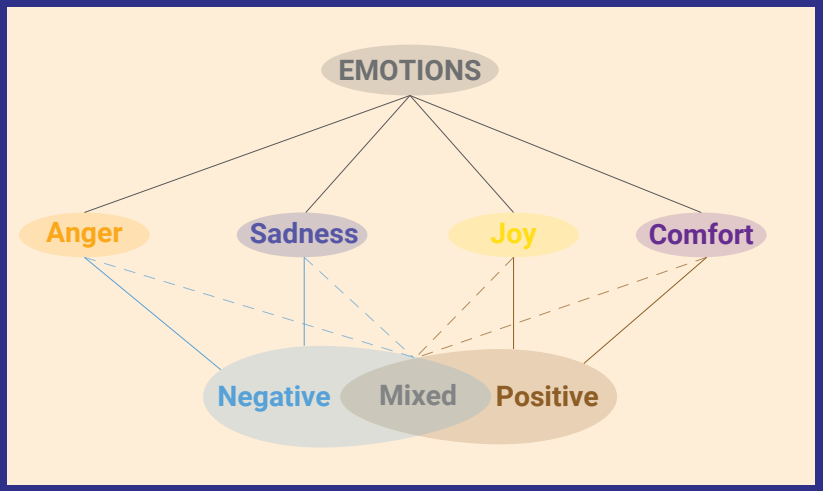
Remembered Space



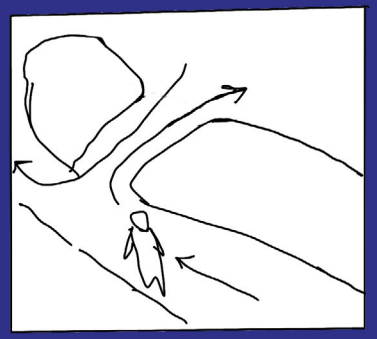
Perceived Space



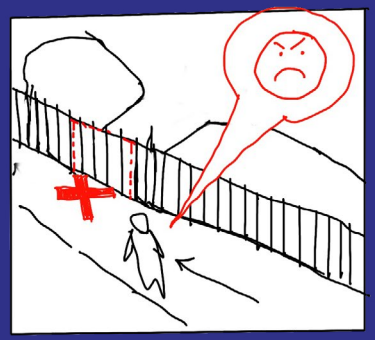
Digital (shared) Space



Adapted from Ekman's basic emotions, 1999.



Yesterday

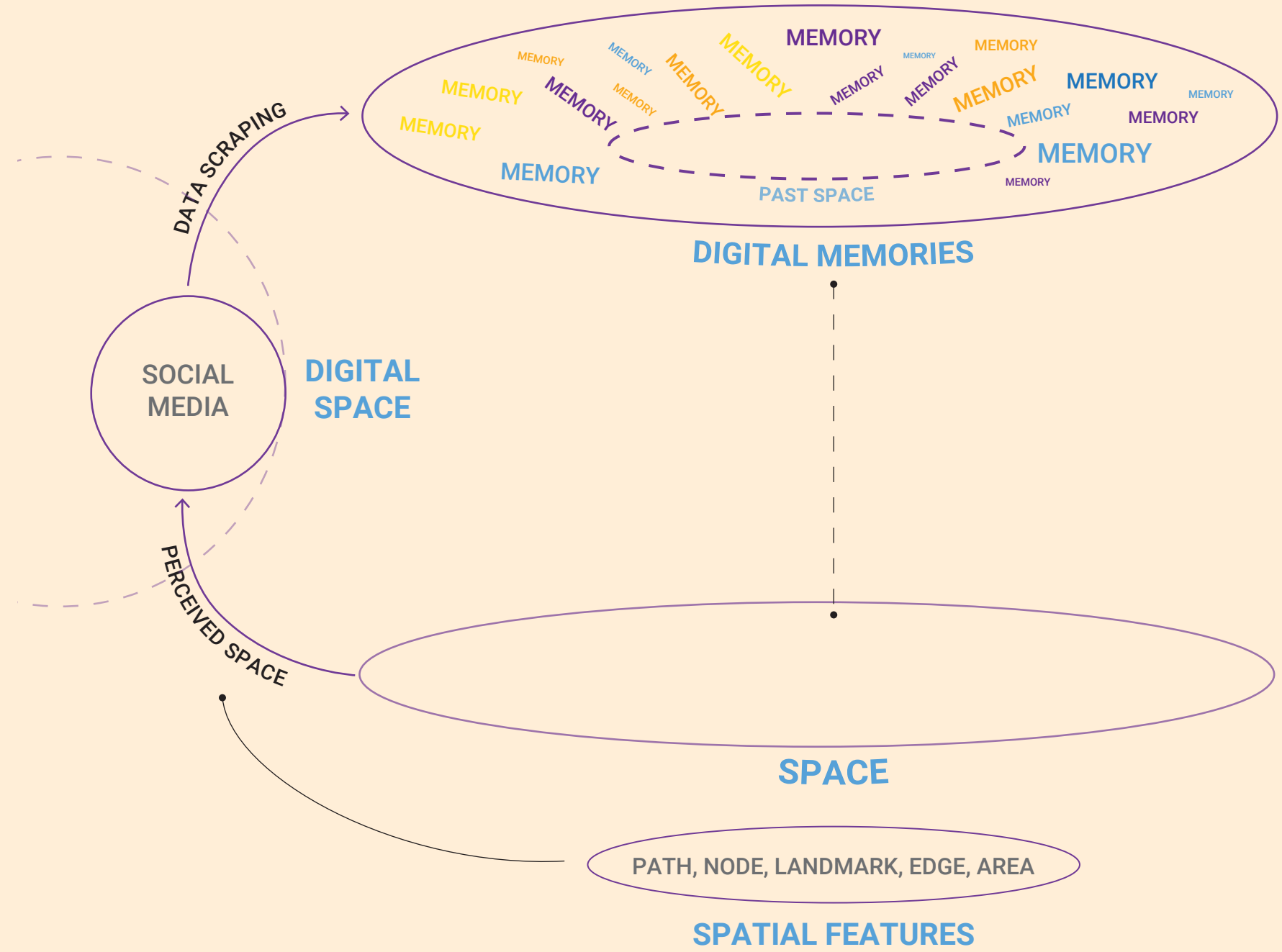


Today

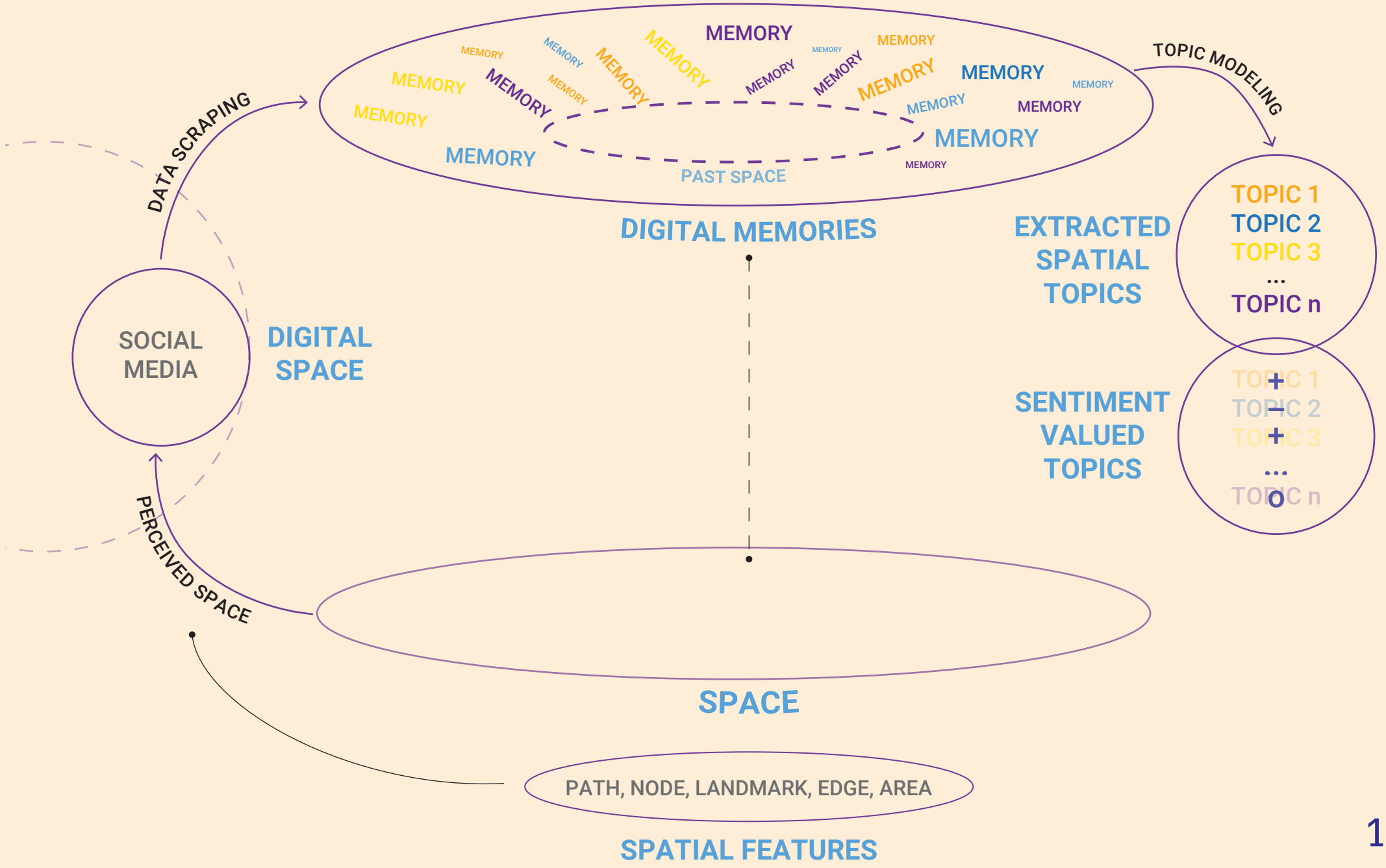
Literature Review



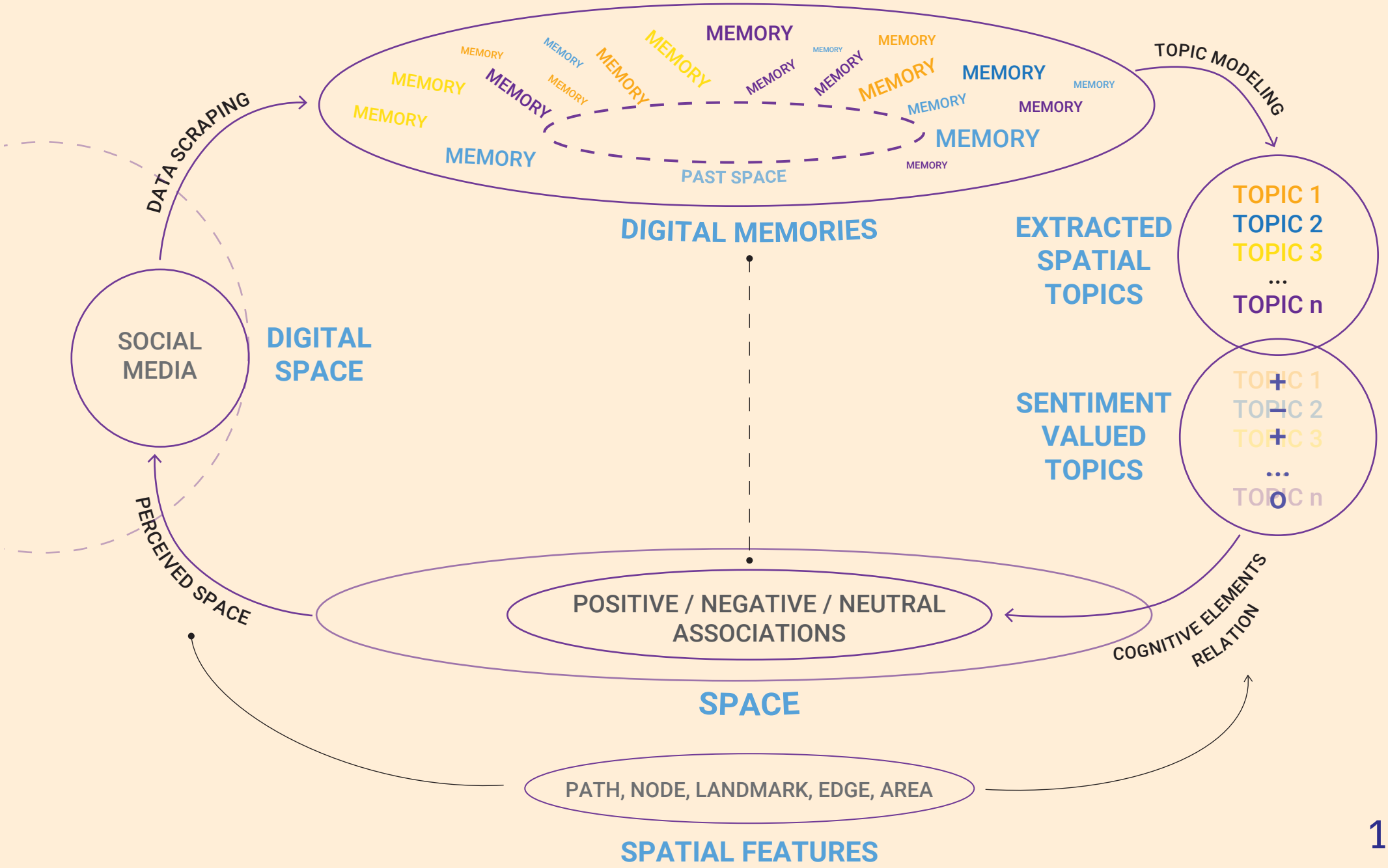
Conceptual Framework



Conceptual Framework



Conceptual Framework



Question

*3. What **spatial values** do citizens share about the **City Theater's space transformation throughout time** (before and after the intervention) on **social media**?*

Scope

1st Scale: City Theater Square



Google Earth Engine, 2026

- Contemporary History
- Cultural Heritage
- Popular (City Center)
- Socio-political Events
- Urban Focal Pointv

  (functions & mobility)

Scope

2nd Scale: Tehran

Key Public Spaces in Tehran



Fzn.parham, 2015.



Akbbayat, 2012.

Tajrish Sqr.



Tripadvisor, 2026.

Vanak Sqr.

Legend

- District 11
- Other districts

1 : 165000

Tehran University

Vali'asr St.



Tolouei, 2024.

Enghelab Sqr.

Enghelab St.

City Theater



Mehrnews, 2026.



Jafari, 2020.

Hassan Abad Sqr. & Toopkhaneh Sqr.

Grand Bazaar & Sabzeh Meydan Plaza









Scope

X (formerly Twitter)

2015 - 2025

Users 7.14%

4th most popular after Instagram, Facebook and Pinterest

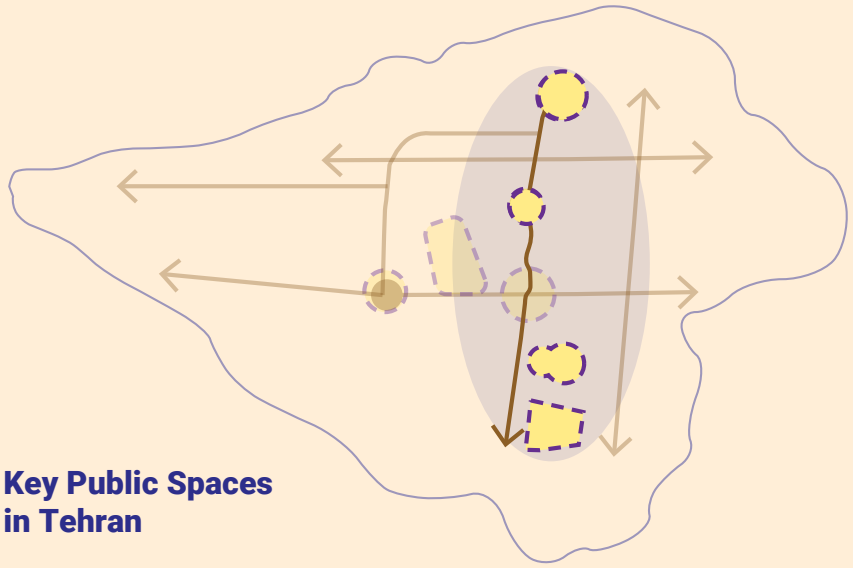


- **Critical space (less filtered)**
- **Daily life sharing**
- **Descriptive (text-oriented)**

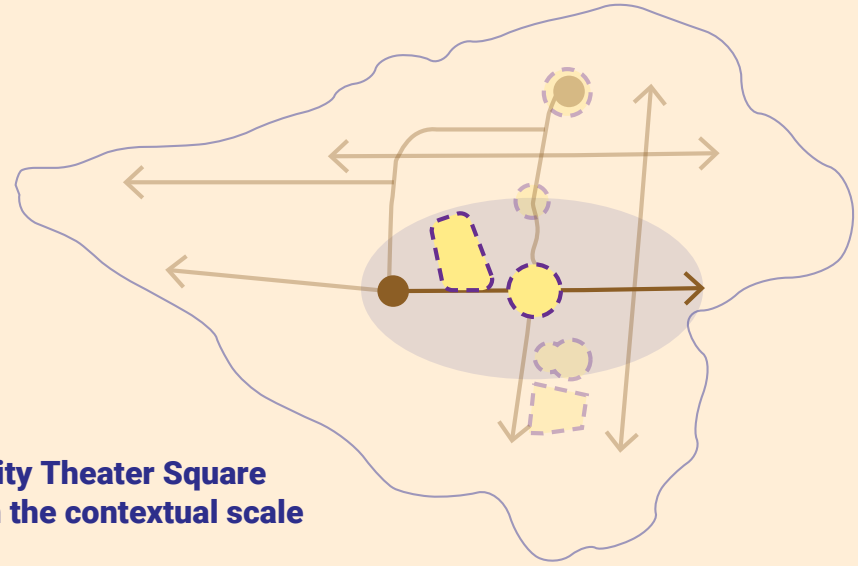
Statcounter, 2026

Methodology

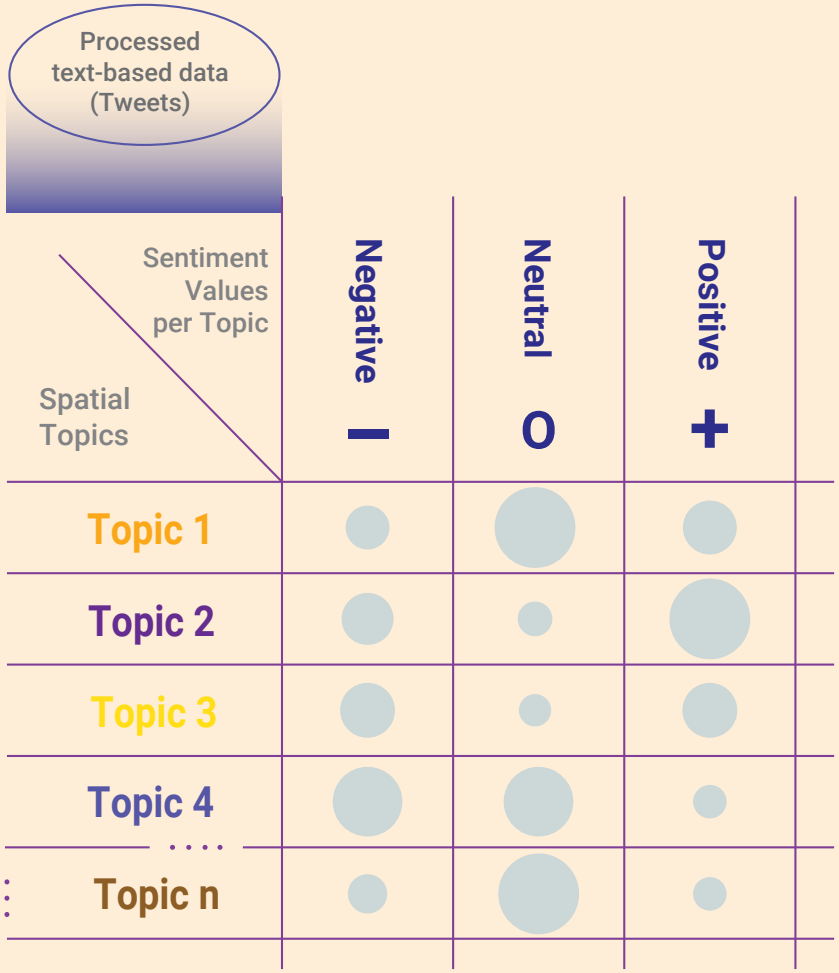
Co-occurrence Matrices



Key Public Spaces
in Tehran



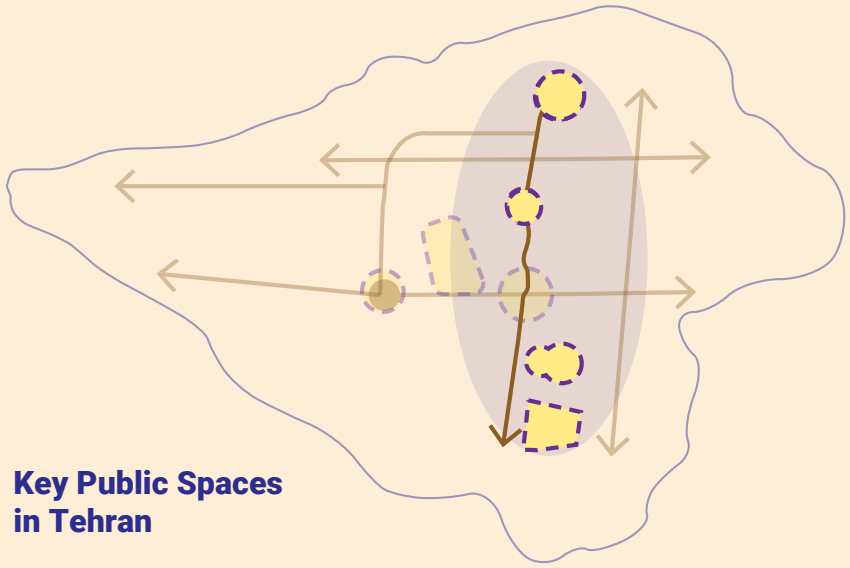
City Theater Square
in the contextual scale



T0: 2022-2024

Methodology

Co-occurrence Matrices



Key Public Spaces
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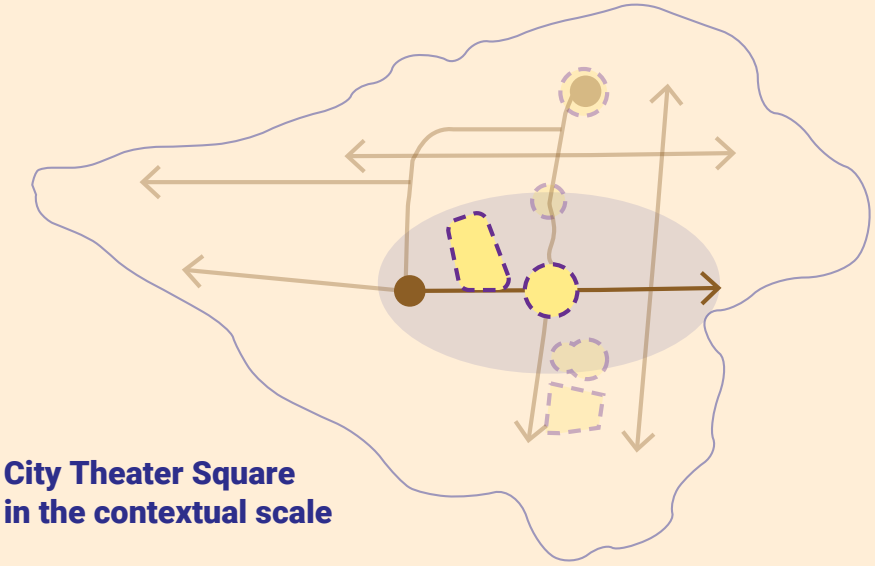
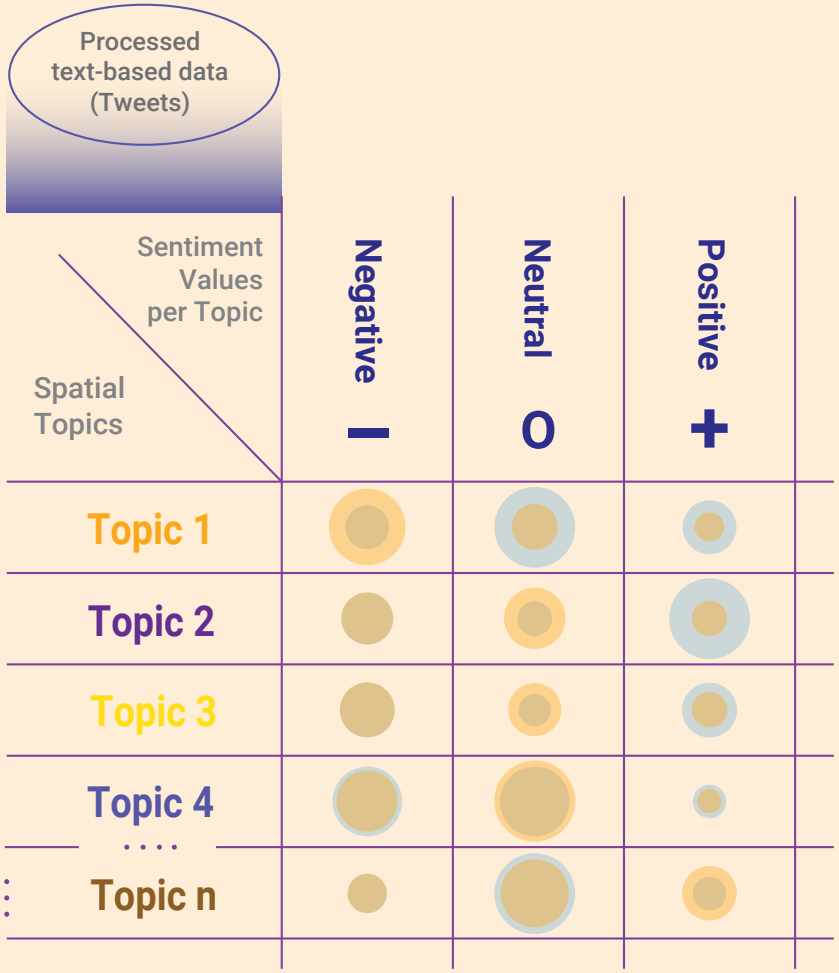


City Theater Square
in the contextual scale



T0 & T1: 2024-2026

Key Steps

Data collection, ~8k tweets Preprocessing ~6.7k tweets







Key Steps

Preprocessing & Analysis 13 Localised Spatial Topics & 1794 Tweets

Valiasr is losing its greenest capital, **trees** that were once Tehran's identity.

Negative –

Sentiment Analysis

→ **Valiasr-Tajrish** Tree Preservation & Urban Ecology

Topic Modeling (Word Embedding)

Petition to stop **City Theater**'s wall installation.

Neutral 0

← Urban Management & Heritage Protection **(City Theater)**

Therapy? No, thanks. I go to **Tajrish market** "hearts"

Positive +

→ Emotional Attachment to **Tajrish**

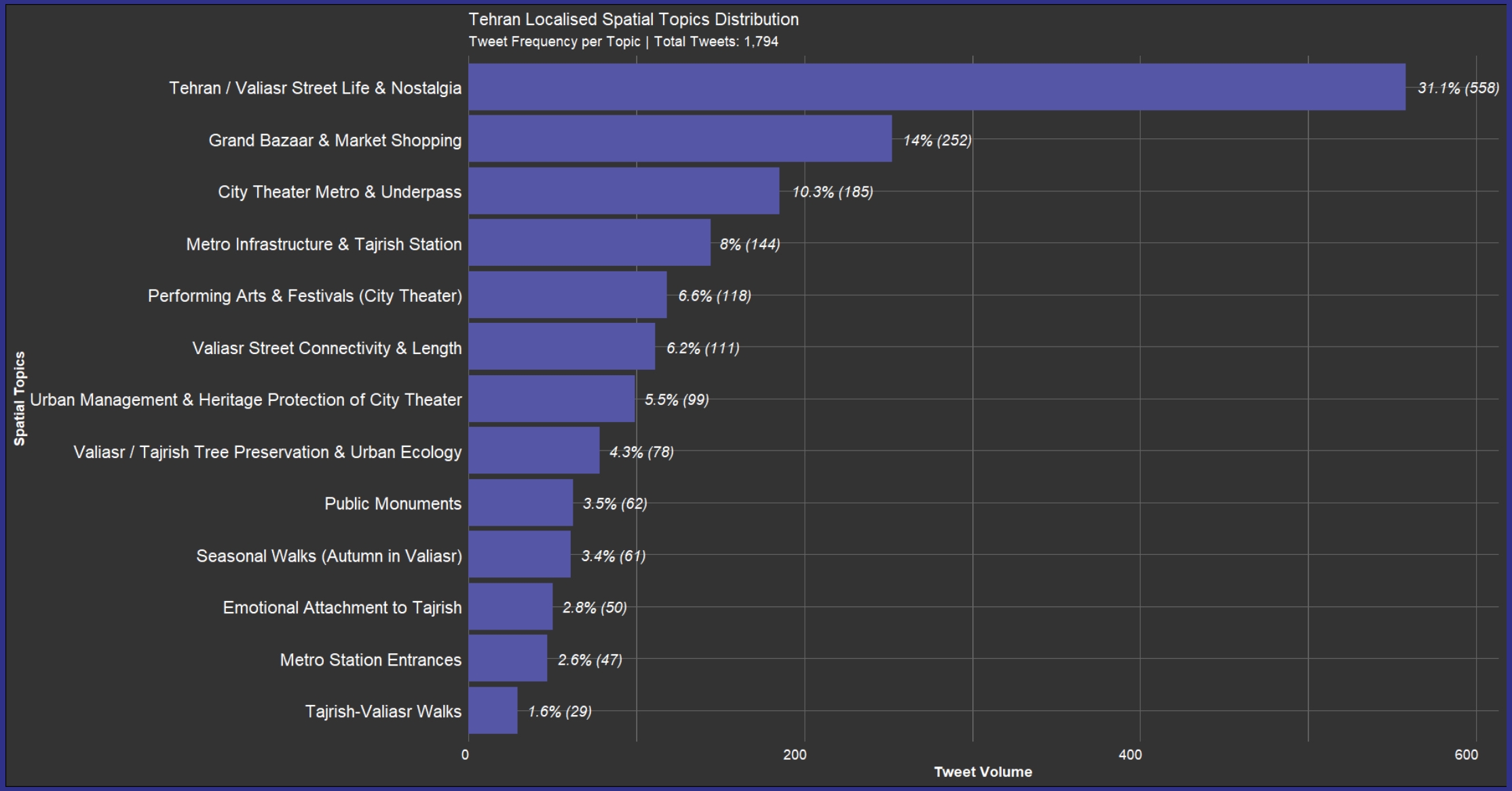
Results

Localised Spatial Topics



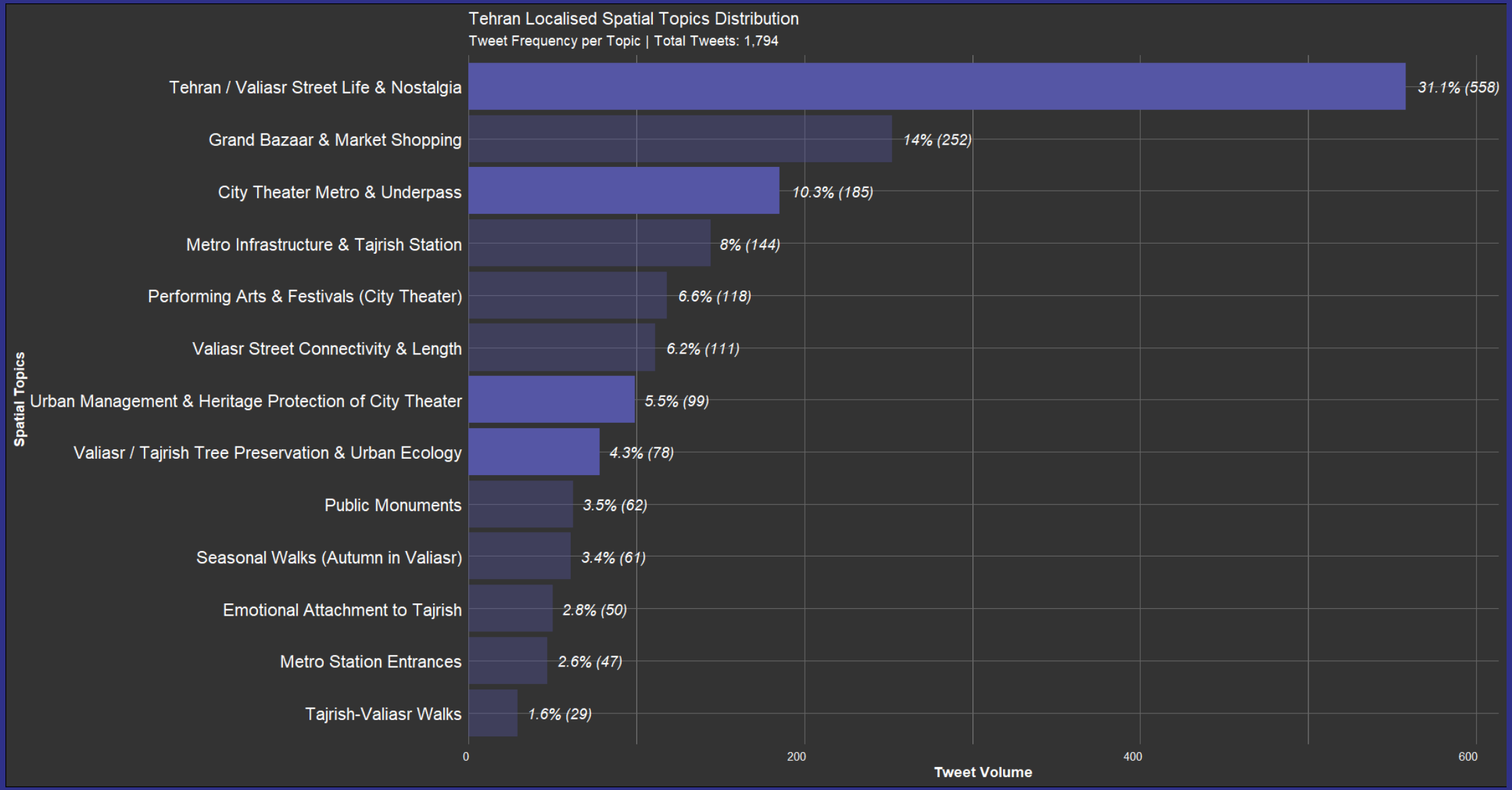
Results

Topic Distribution



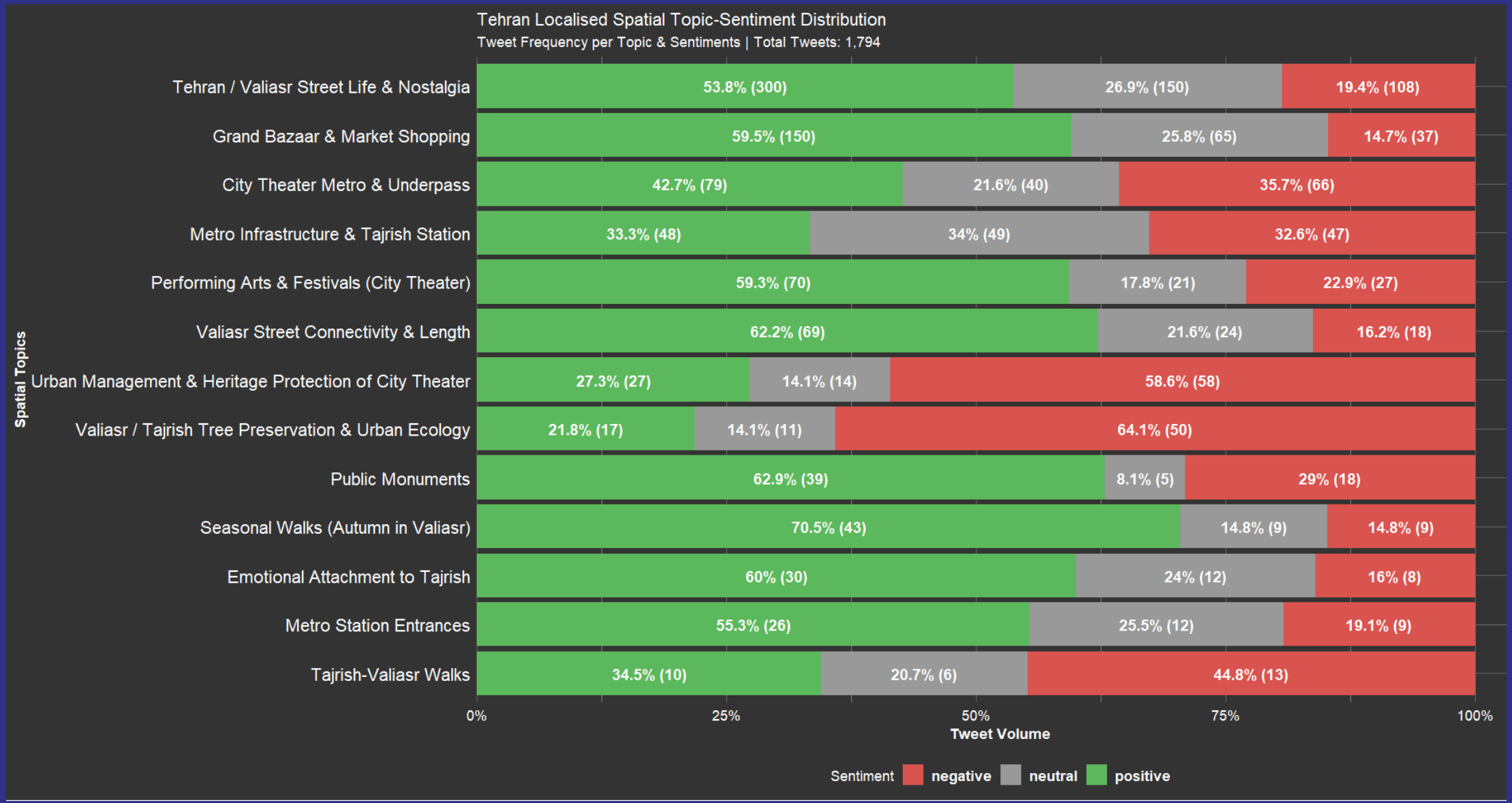
Results

Topic Distribution



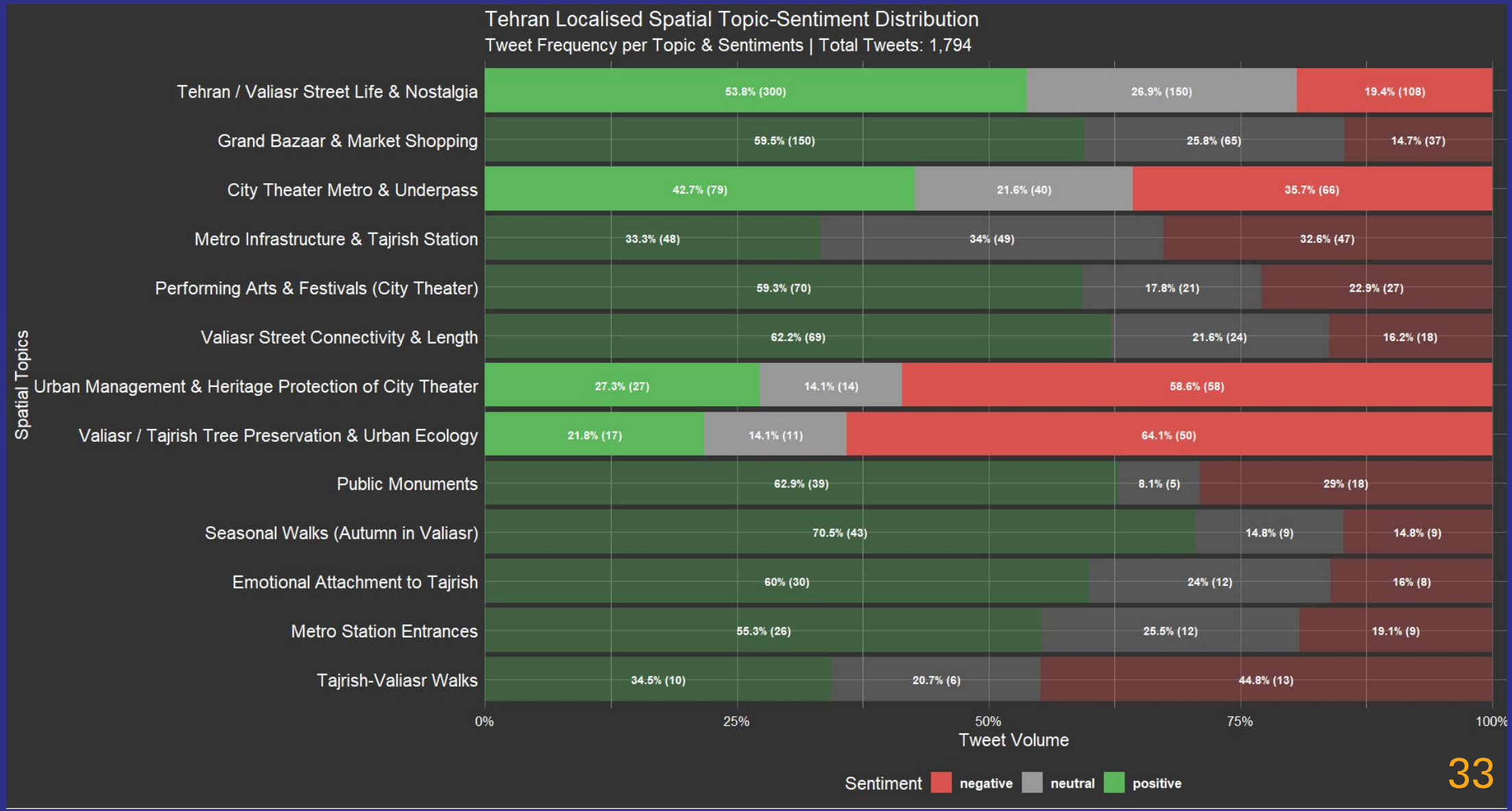
Results

Topic Distribution per Sentiments



Results

Topic Distribution per Sentiments



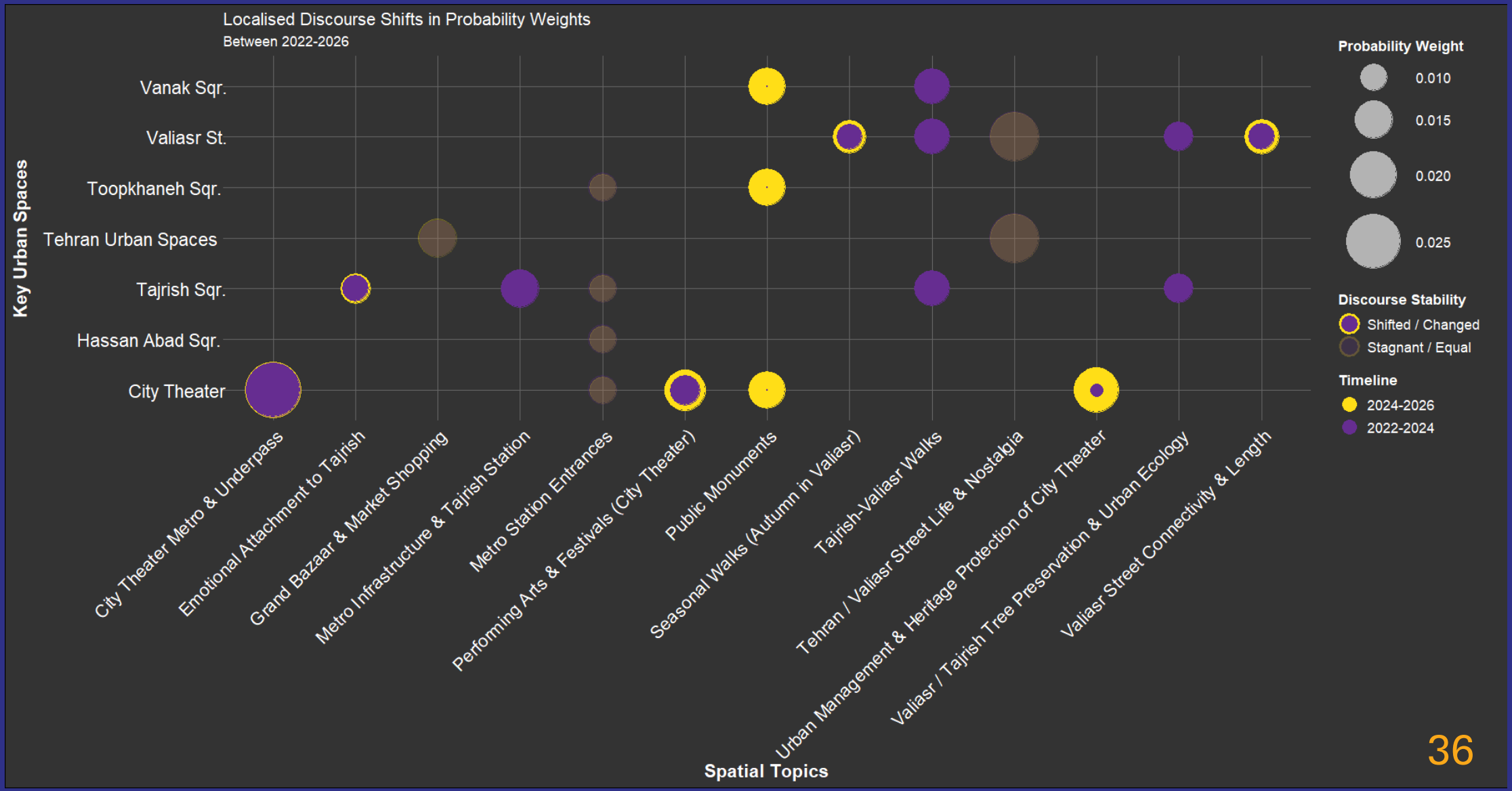
Question

*4. What **spatial qualities** could **be referred to** from the **shared emotions** of Tehran's public spaces and City Theater?*

Results

Co-ocurrence Matrix

Topic emergence & shifts



Results

Co-ocurrence Matrix

Sentiment shifts

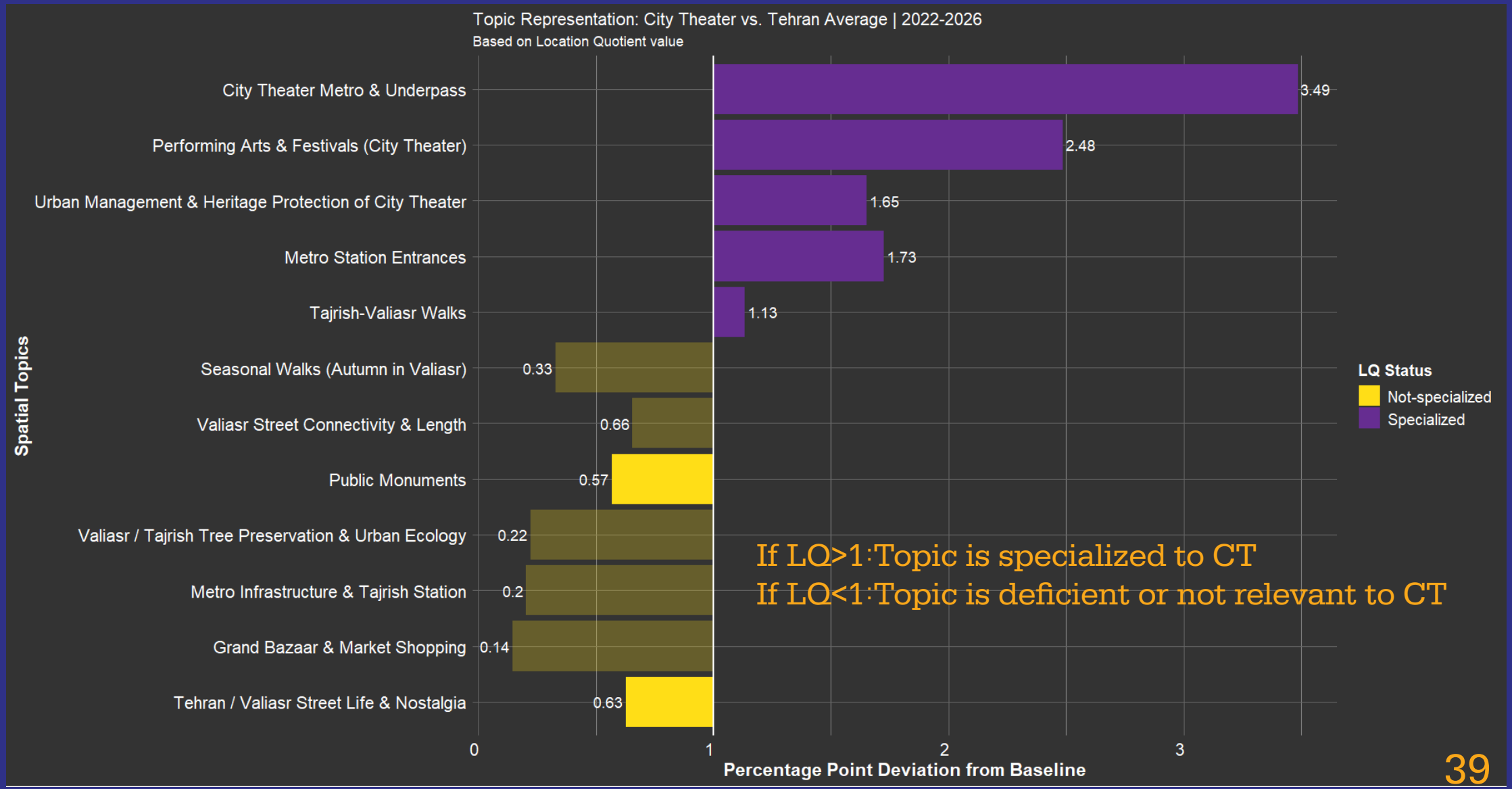


How are you so sure that your hypothesis is *valid*!?

Over/Under Representation based on Location Quotient

Intensity

Location Quotient = (% of Topic A in City Theater) / (% of Topic A in all of Tehran)



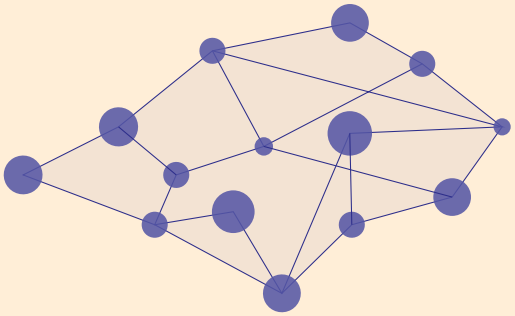
Question

*5. How can **shared memories on social media inform design guides** for Tehran's public spaces?*

Missing Link

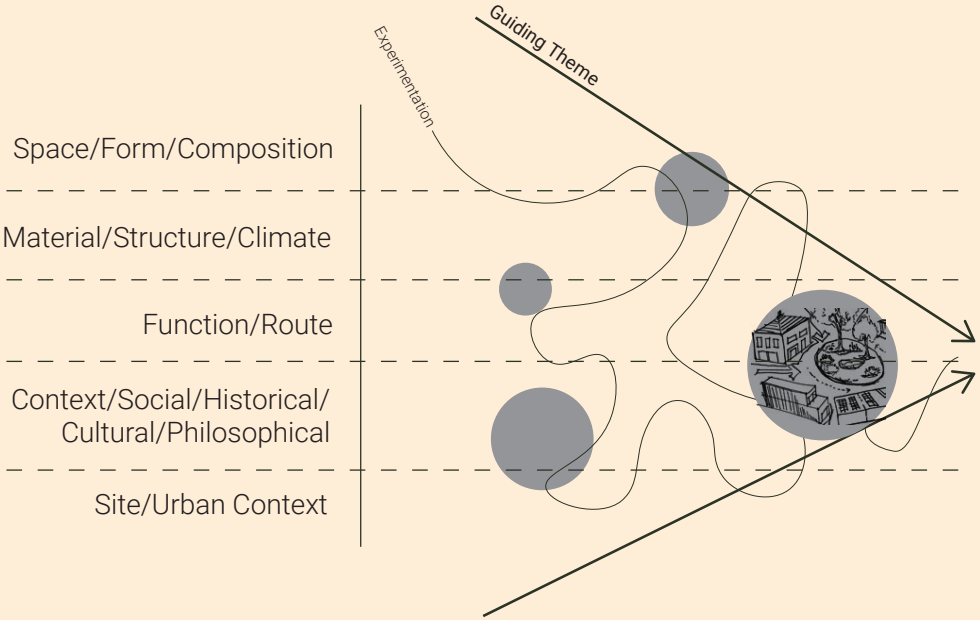
Public Inputs as Analytical Results

Public Inputs



Topics, Sentiments, Tweets

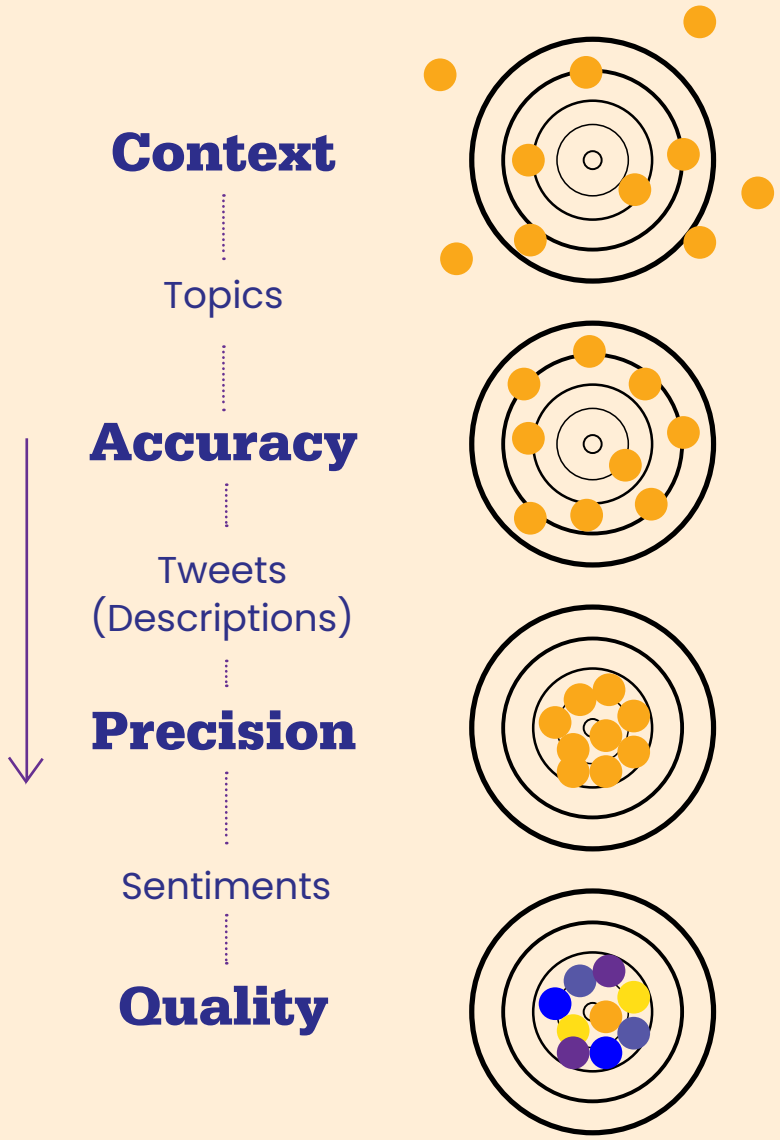
Design as a process within the domains



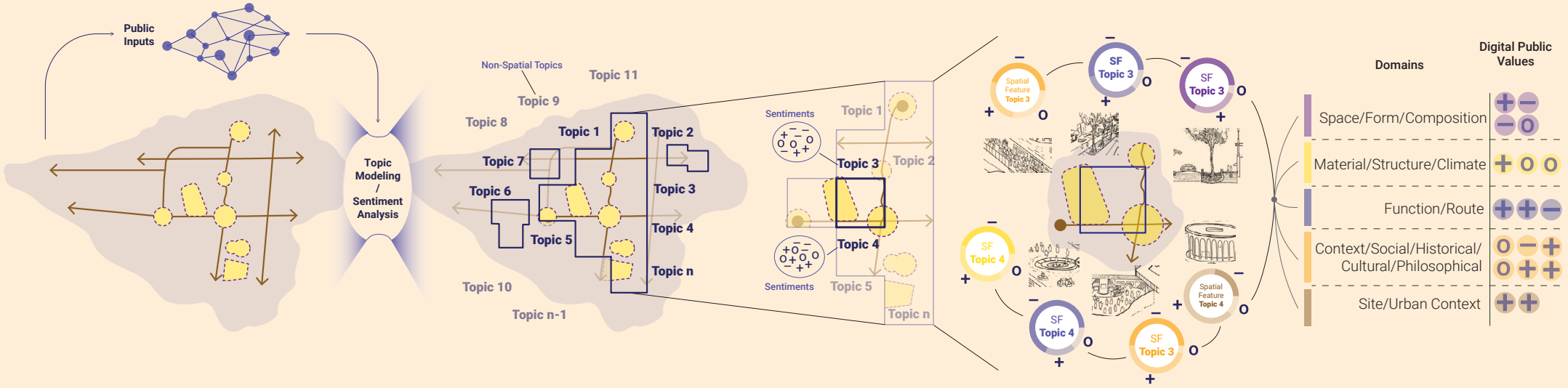
Van Dooren et al., 2014.

Design Framework

Linking Analysis to Design



Design Framework



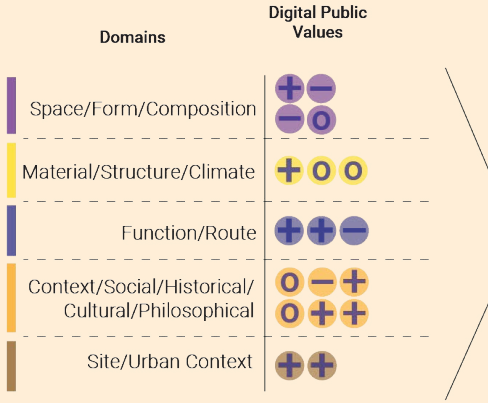
A1. Urban Context

A2. Accuracy gain with general spatial topics

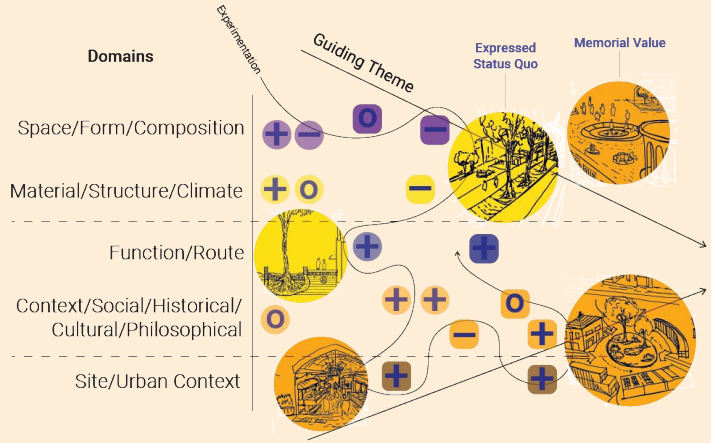
A3. Precision on places with localised spatial topics

A4. Quality gain of spatial features with sentiment values

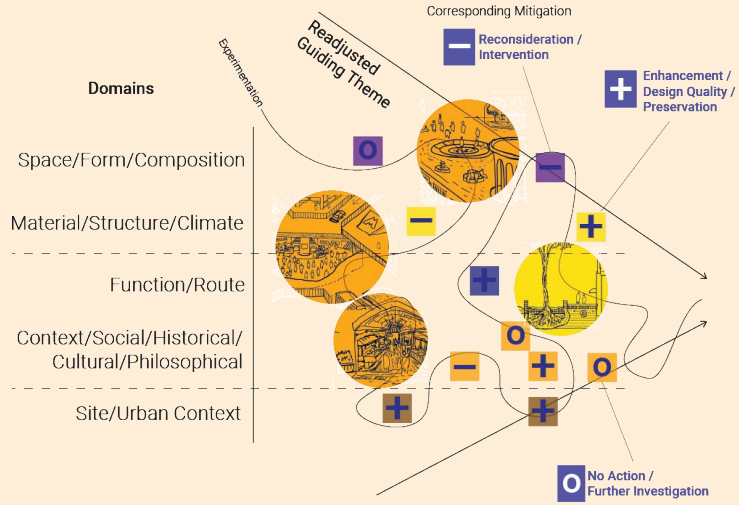
A5. Value allocation to domains



D1. Beginning of Design



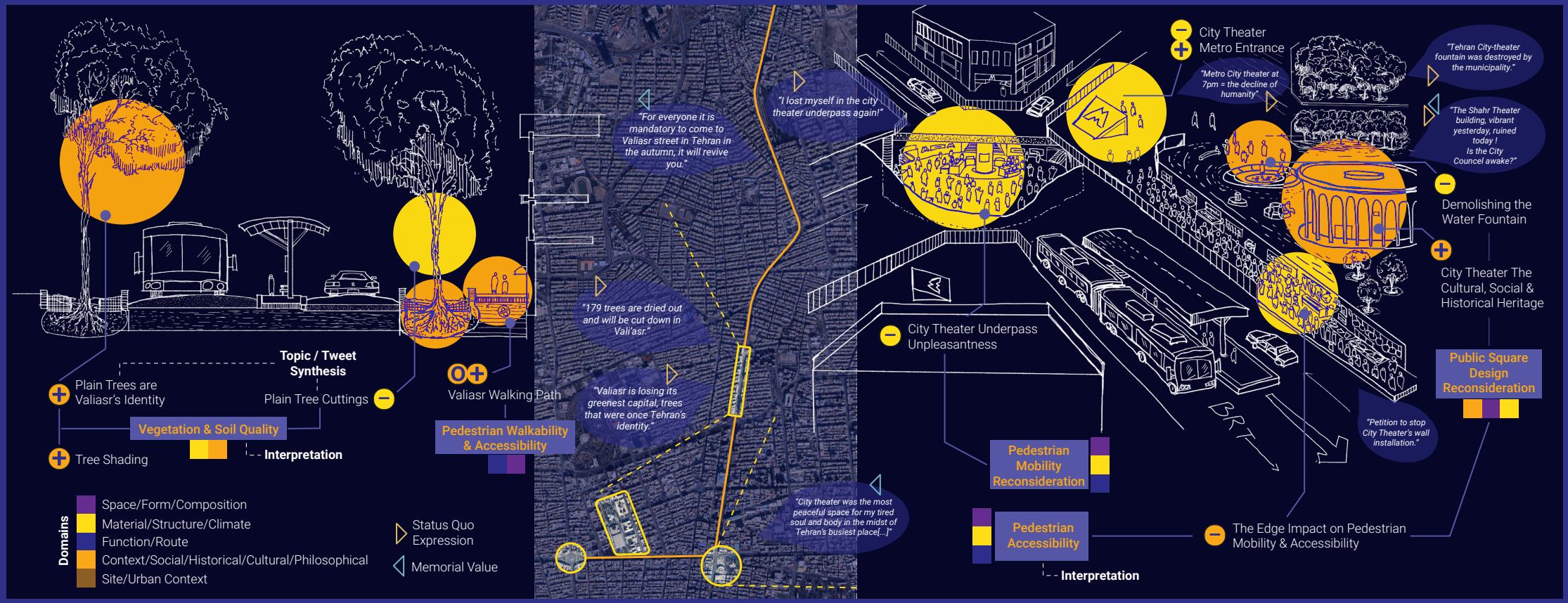
D2. Design Under Progress With Guiding Values



D3. Final Design Process With Applied Guides

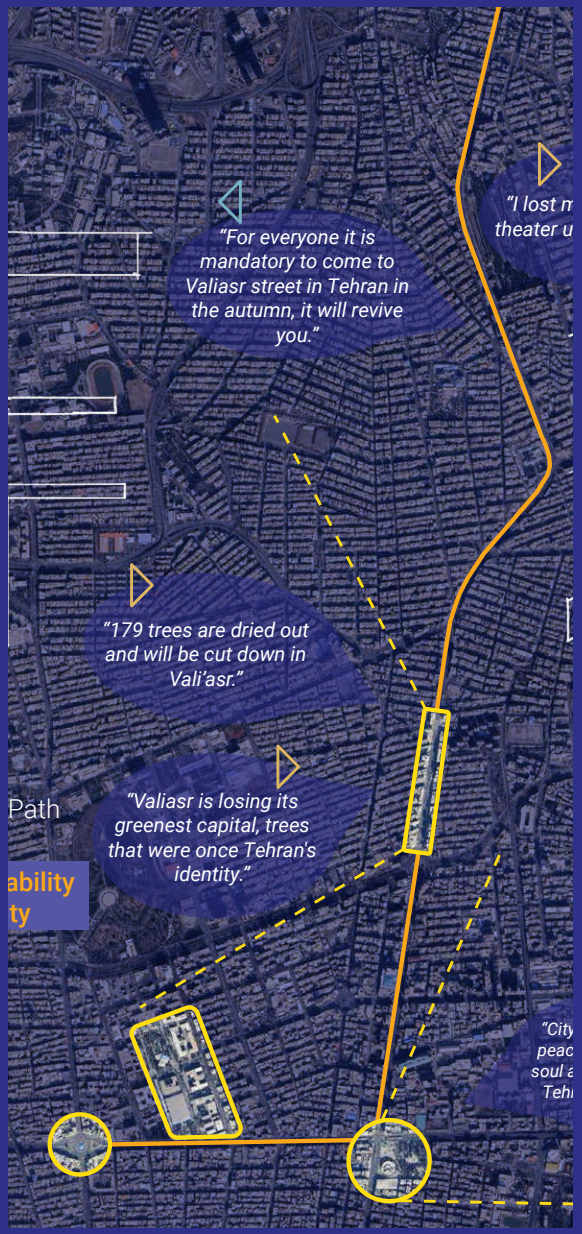
Design Framework

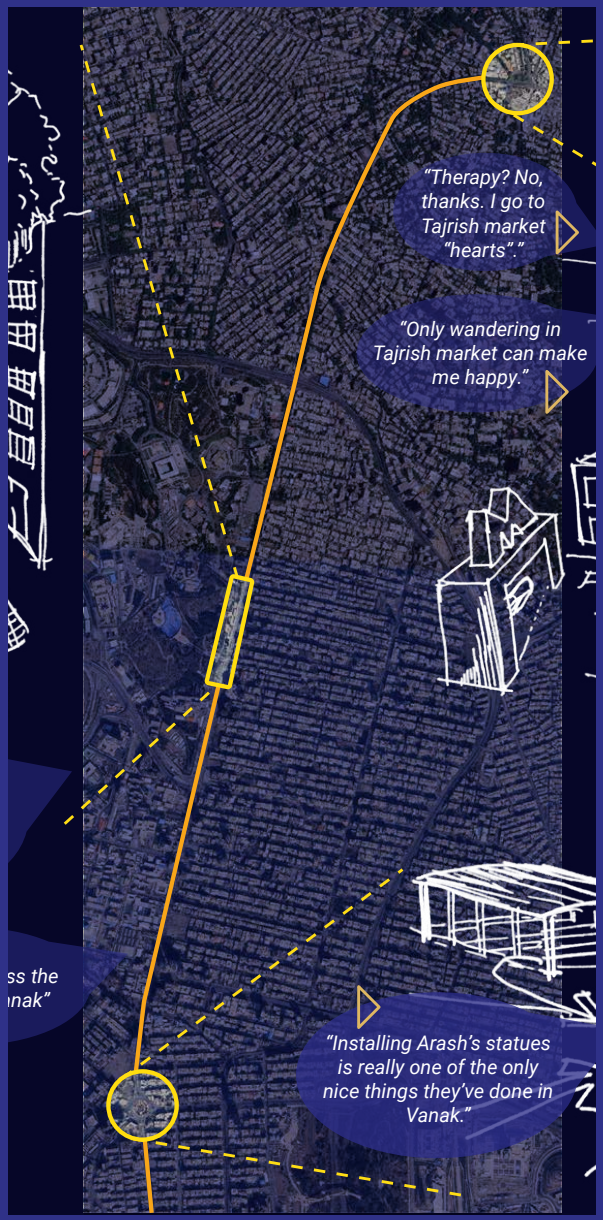
How it's applied

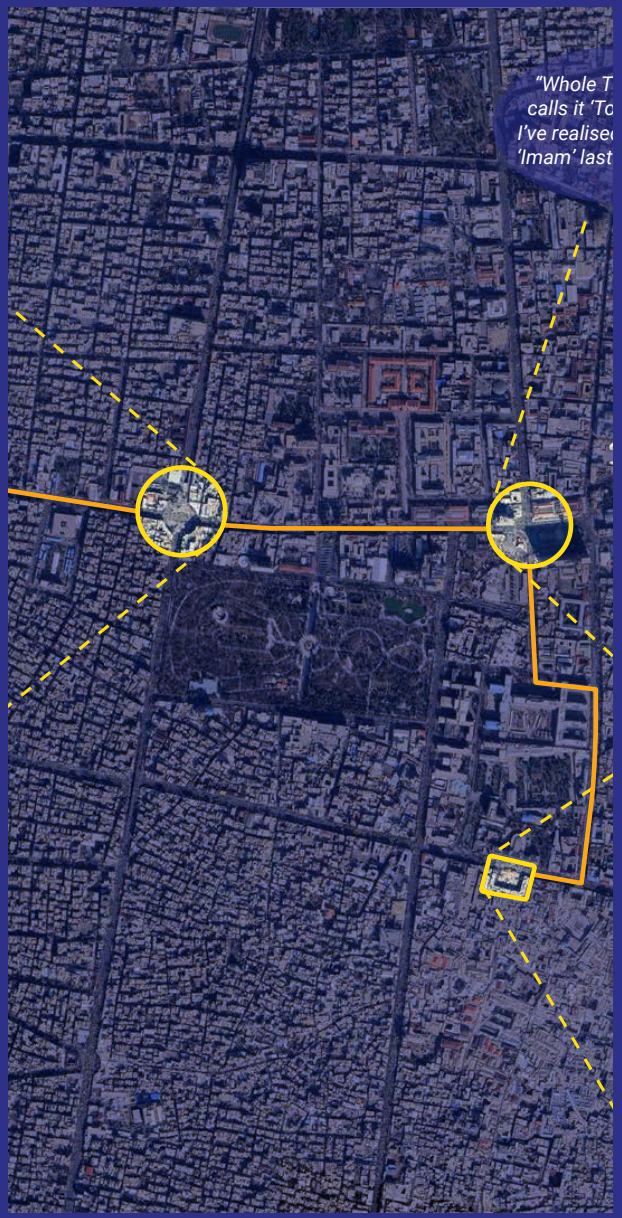


Design Framework

How it's applied

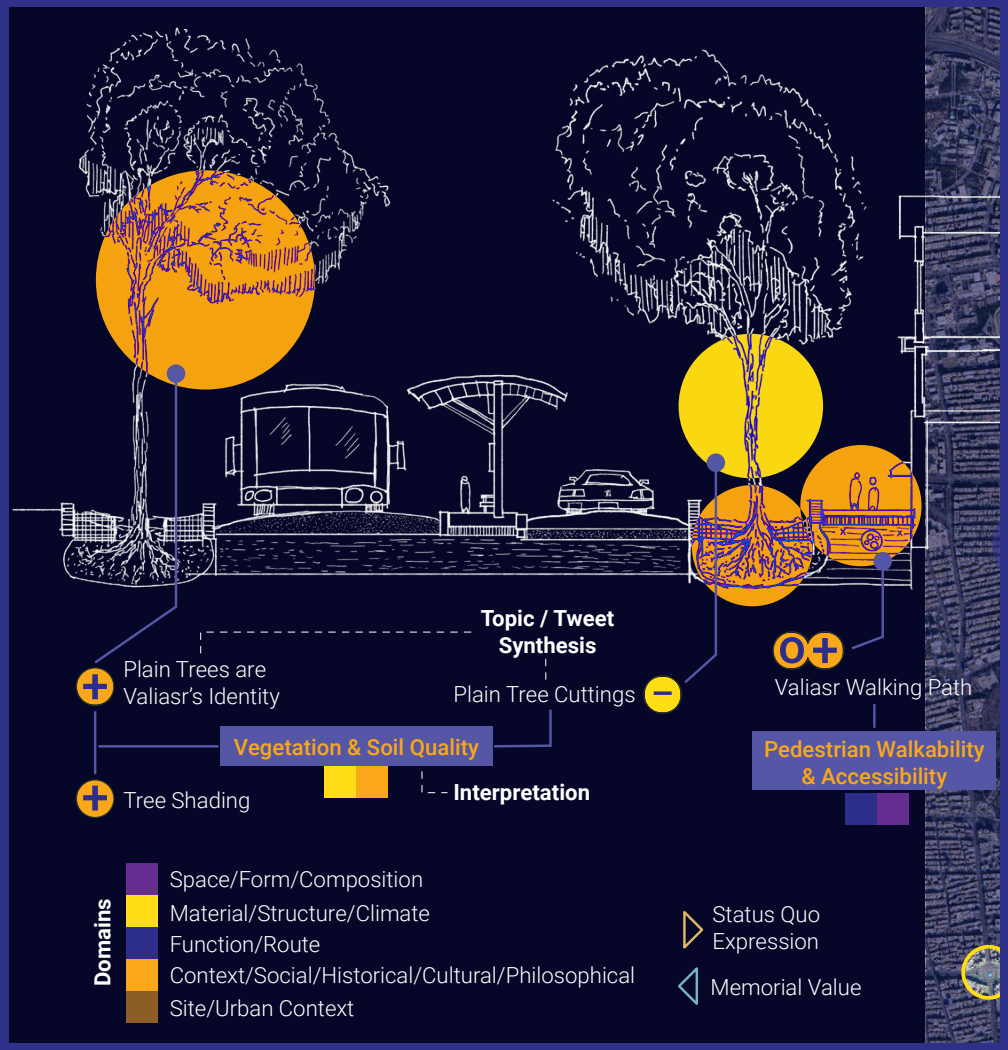


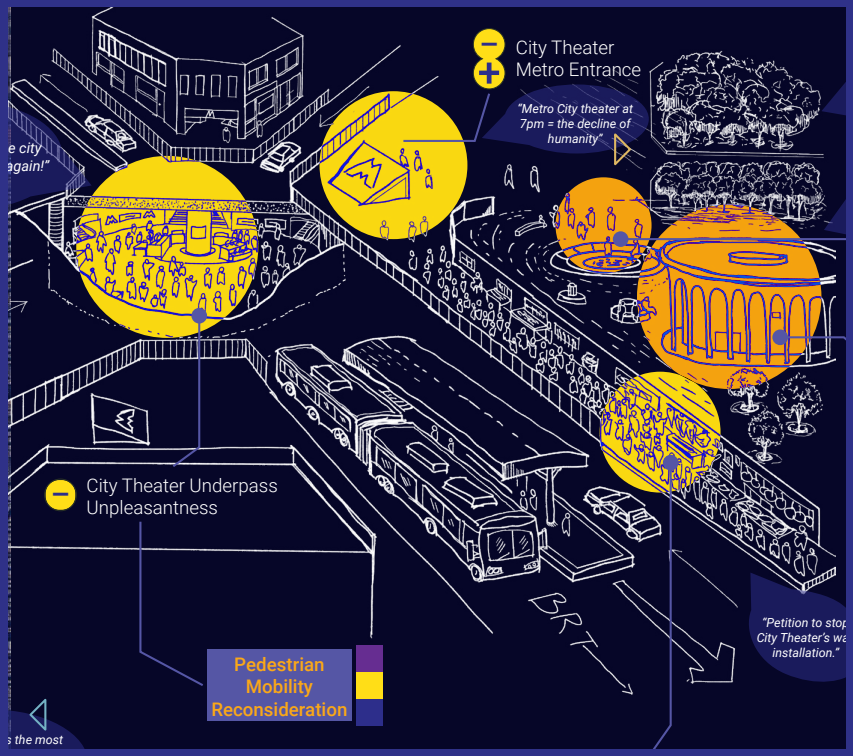


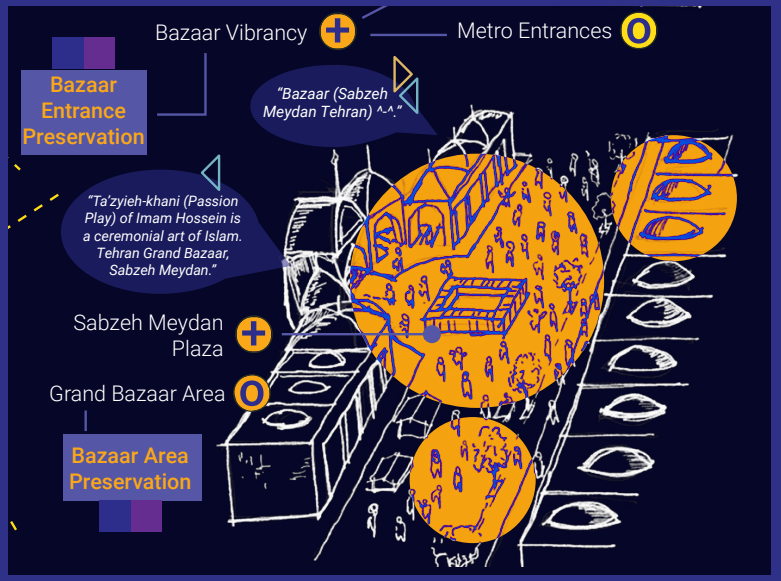


Design Framework

How it's applied



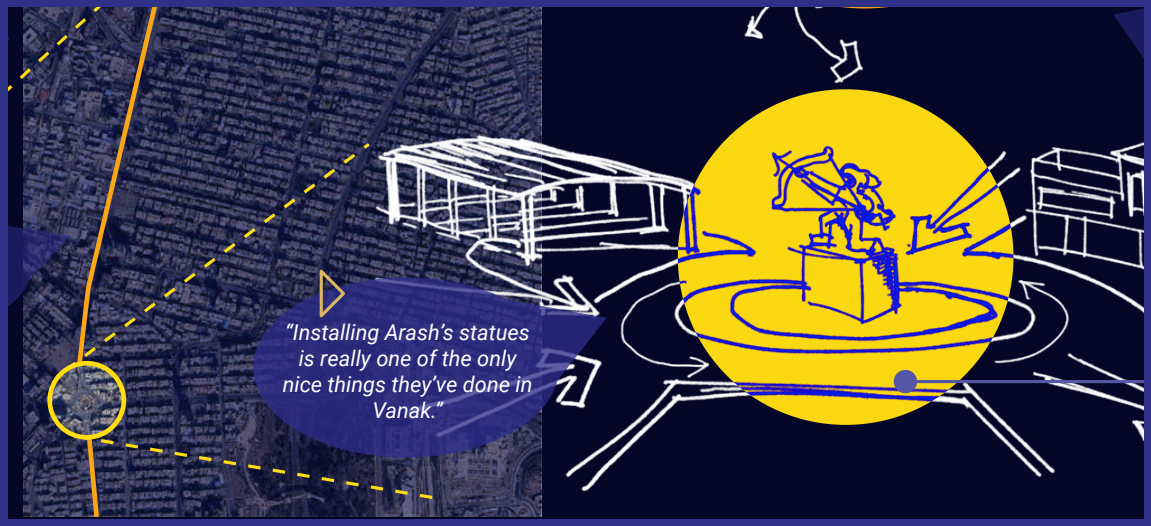




Design Framework

Digital Memory Characteristics

Status Quo Expression





Memorial Value

Design Framework

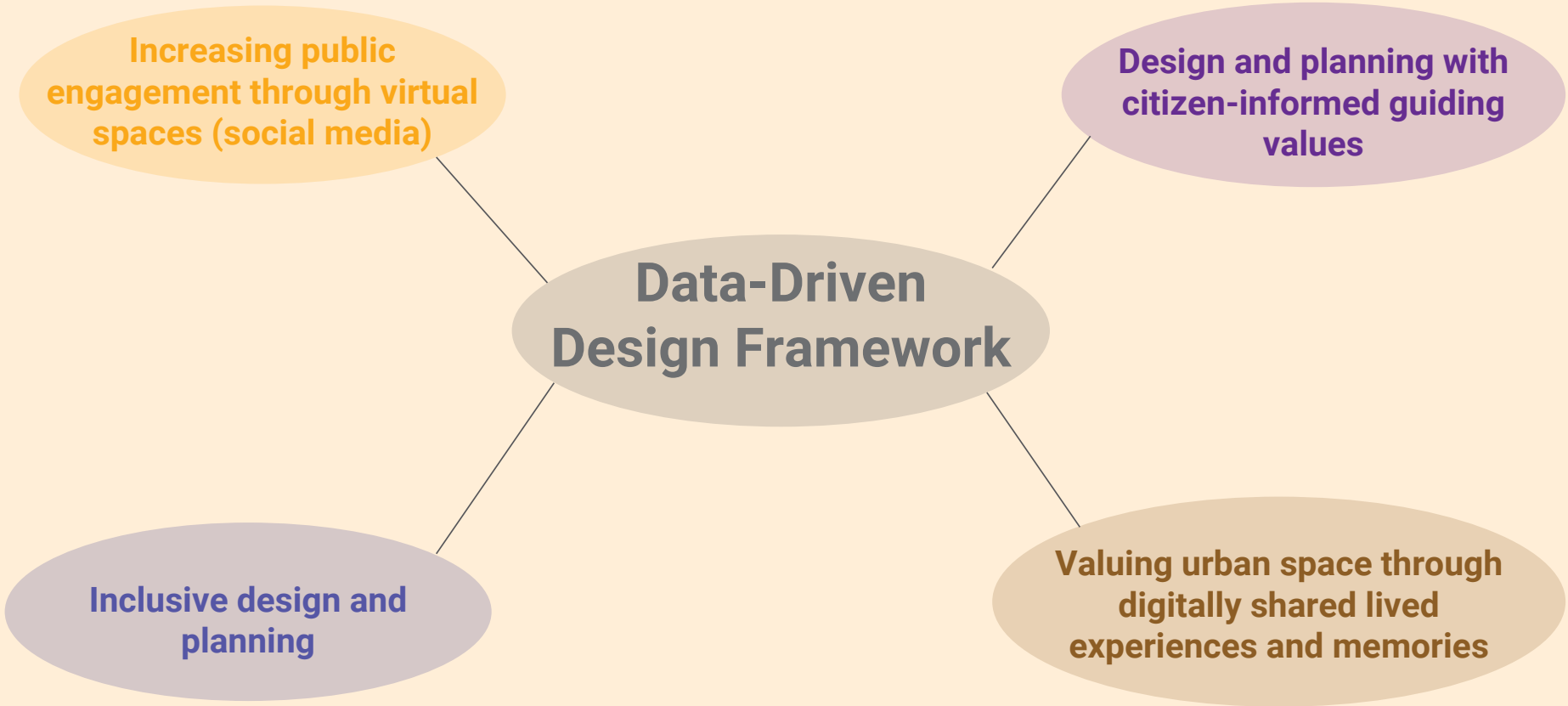
Design/Policy Mitigations

Design Domain	Tajrish	Vali'asr	City Theater
Space/ Form/ Composition	**Place-Making** • Sitting spaces within the market area • Highlighting gathering spots around the retail and leisure functions. **Sense of Belonging** • Preserve the existing market space with historical architecture • Preserve the identical territories of the market and square	**Pedestrian Walkability & Accessibility** • Spatial connection of pedestrian paths all along the street with other connections • Sidewalk space configuration based on street width and vegetations • Urban furniture design and placement • Visual and physical consistency of pavement • Pedestrian flow	**Pedestrian Walkability & Accessibility** • Sidewalk space configuration based on street width and vegetations • Sidewalk & square design based on pedestrian flow • Open square space organization & configuration
Material/ Structure/ Climate	–	**Vegetation & Soil Quality** • Strict greenery preservation regulations • Tree & soil profile re-engineering • Water drainage and collection system • Grass pocket design along the sidewalks • Porous pavement (water drainage)	**Pedestrian Walkability & Accessibility** • Pedestrian-priority elevated ramp • Urban furniture design & placement • Visual and physical consistency of pavement • Underpass profile redesign
Function/ Route	**Mixed-Use** • Placing diverse functions and activities around the square area • Improving the activities around the metro station **Pedestrian Walkability & Accessibility** • Spatial connection of pedestrian paths all along the square with the surroundings • Pedestrian priority path between the square, metro station and the market	**Pedestrian Walkability & Accessibility** • Spatial connection of pedestrian paths all along the street with other connections • Pedestrian flow • High-demand activities within the walking distances at each street segment	**Pedestrian Walkability & Accessibility** • Spatial connection of paths across the square and junctions • Sidewalk & square design based on the pedestrian flow
Context/ Social/ Historical/ Cultural/ Philosophical	**Place-Making** • Leverage of hotspots in the market and square **Sense of Belonging** • Historical value of Tajrish square • Socio-economic identity of the Tajrish square in Tehran's cultural history	**Ecological Heritage** • Highlighting the trees as the Valiasr's living identity within Tehran • Acknowledging the historical significance of Valiasr's plain tree rows.	**Public Square Design Reconsideration** • Acknowledge the historically/memorially values spatial features within the square • Preserve the valued territories of the square based on daily activities and presence • Leverage the existing identity with new interventions respecting the context
Site/ Urban Context	Emotional attachments to Tajrish	Vali'asr street plain trees and walking path	Art/culture intersection at the City Theater

This looks interesting...

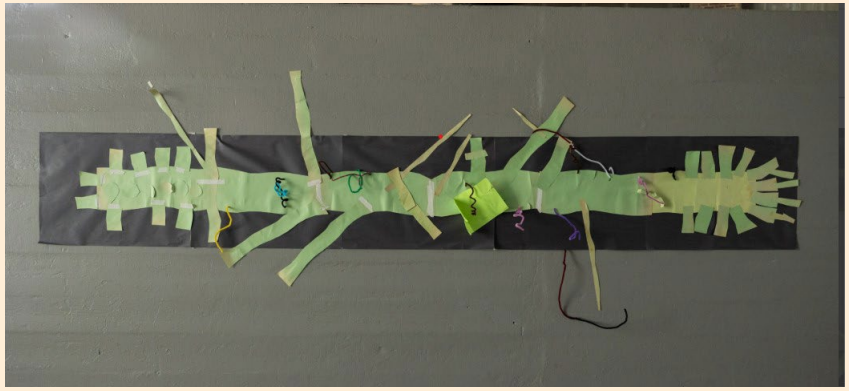
but *why* should someone use it, and *where*?

Proof of Concept



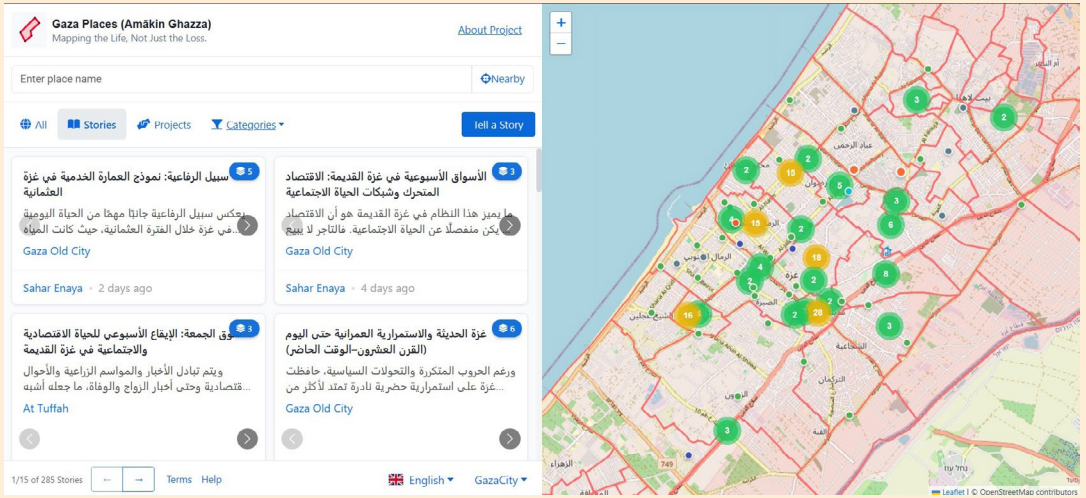
Implementations

- A manual framework for the designer/planner [High Line Design Project]



Martin, 2025.

- An interactive public website/app (leaflet maps) [Gaza Places Website]



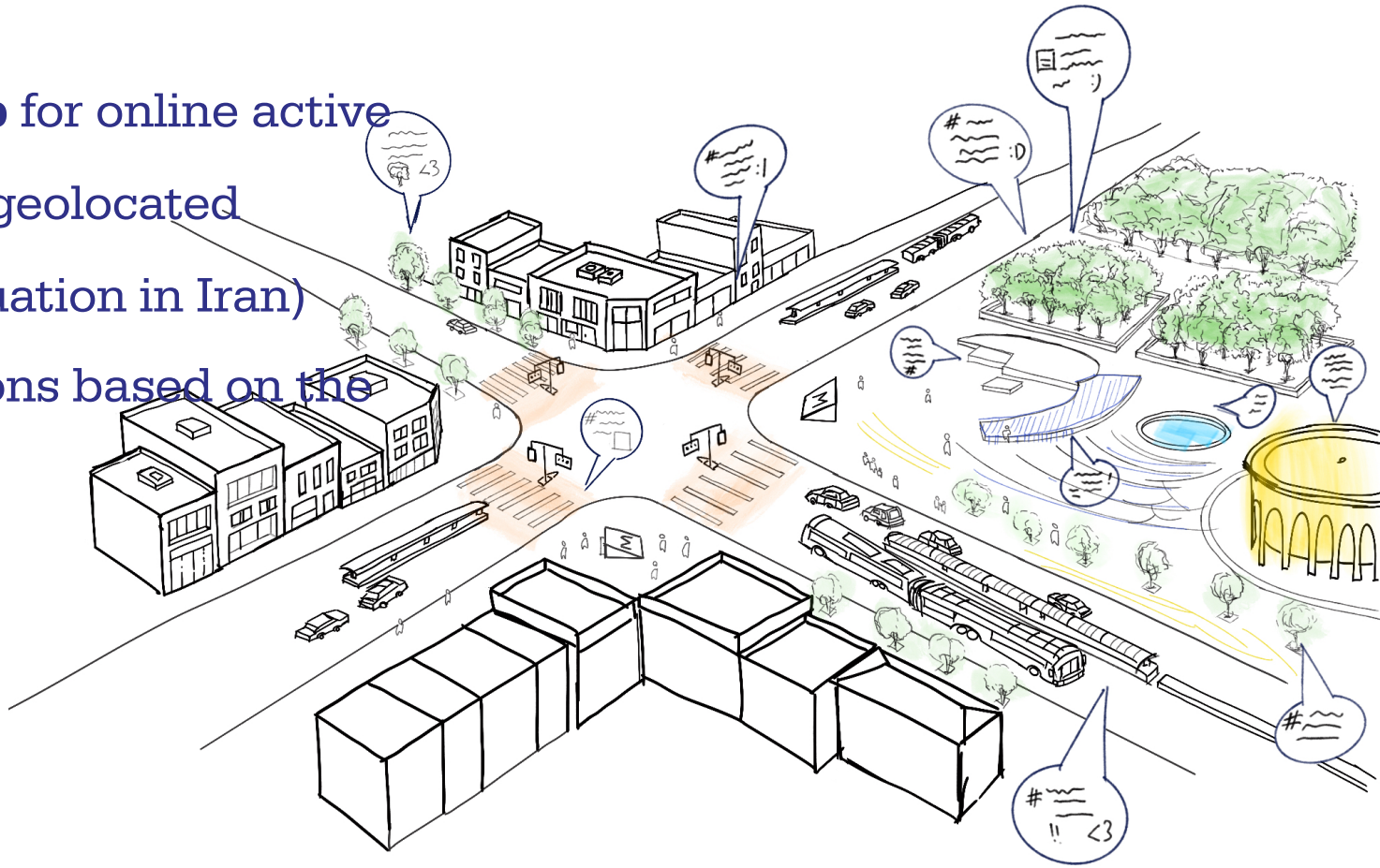
Gaza Places, 2026.

- A web-based platform developed specifically for social-media studies for experts & municipalities

Conclusion

Further Studies & Recommendations

- More significant locations within the city with broader study scope (additional case studies, e.g., **Vali'asr**, or **other cities worldwide**)
- **Developing a leaflet map** for online active citizen participation and geolocated descriptions (Internet situation in Iran)
- **Further design** productions based on the proposed framework



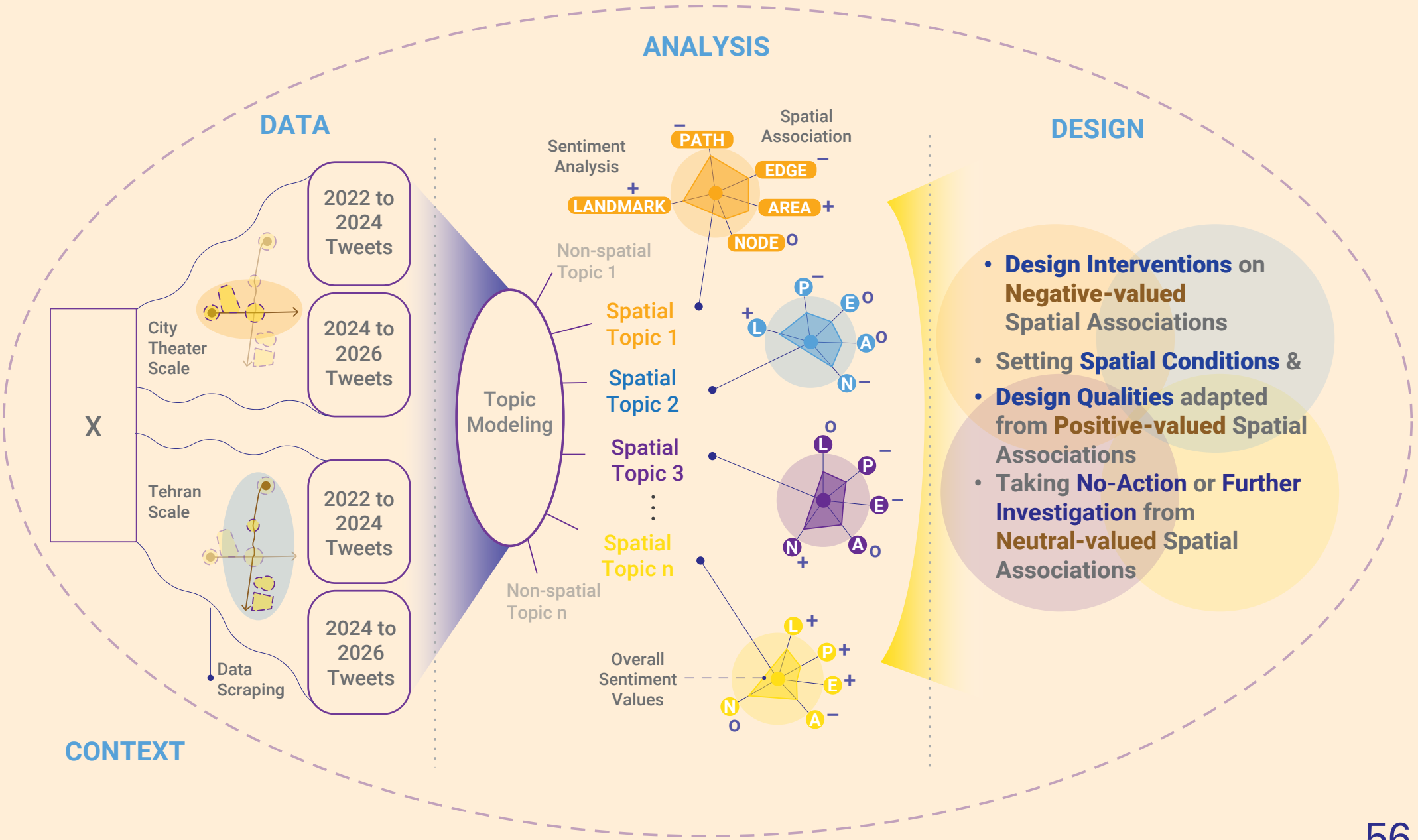
So far, it makes sense!

Let’s see what others think about it...

Appendix

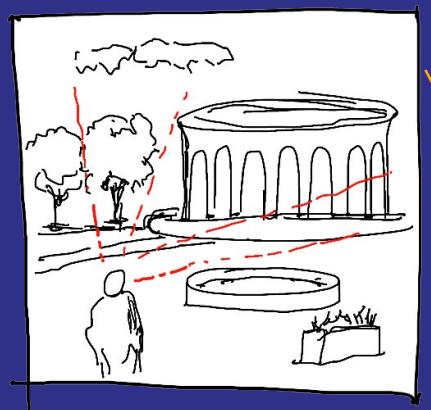
Sub-questions	Method
1. How do digital memories narrate the lived experiences of citizens in Tehran's public spaces on X (formerly Twitter)?	Literature review, Data collection using scraping apps as strings of text, Topic modelling
2. What emotions can be traced from digital memories of the City Theater?	Topic modeling & Sentiment analysis to recognize and classify emotions from texts extracted from Tweets on X
3. What spatial qualities could be referred to from the shared emotions of Tehran's public spaces and City Theater?	Locating the spatial features referred to by emotions through cognitive indicators
4. What spatial values do citizens share about the City Theater's space transformation throughout time (before and after the latest intervention) as reflected on social media?	Classifying the values of spatial features referred to by emotions into positive and negative
5. How can shared memories on social media inform design guides for Tehran's public spaces?	Creating design guidelines based on spatial qualities and interventions corresponding to negative spatial values

Methodological Framework



Introduction

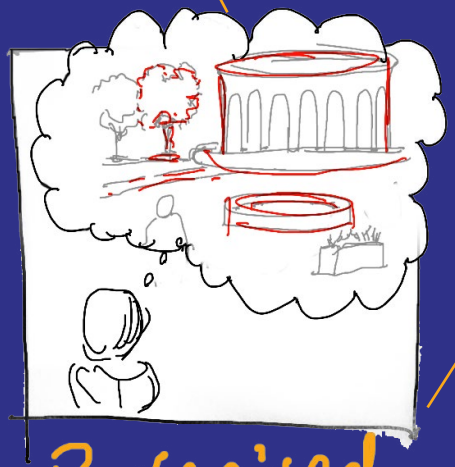
What is Digital Memory?



Space

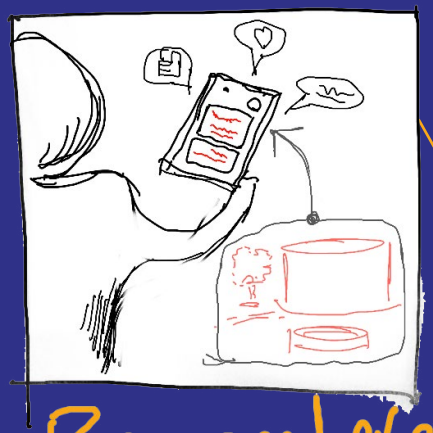
Perceiving

Public Space



Perceived Space

Lived Experience (Memory)



Remembered Space

Sharing Memory



Digital (shared) Space

Digital Memory

Validation

Chi-square

Significance

City Theater

	Sentiments				
	Positive	Neutral	Negative	X^2	P-Value
Before 2024	90	50	126	0.26266	0.8769
After 2024	102	64	150		

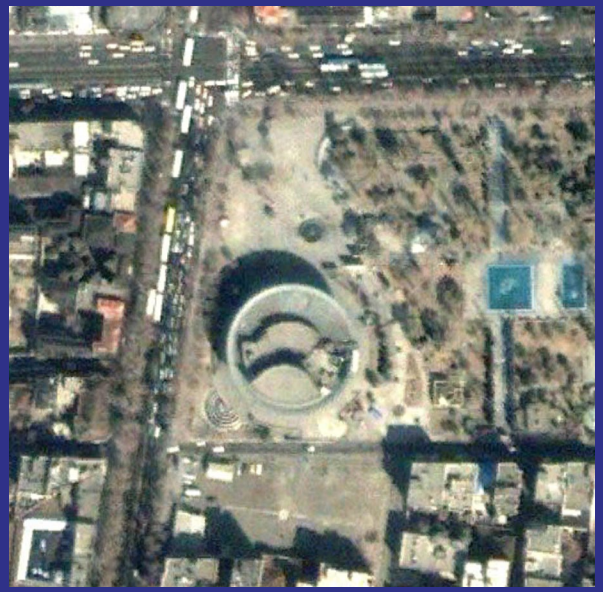
Tehran

	Sentiments				
	Positive	Neutral	Negative	X^2	P-Value
Before 2024	125	152	327	3.2019	0.2017
After 2024	151	152	305		

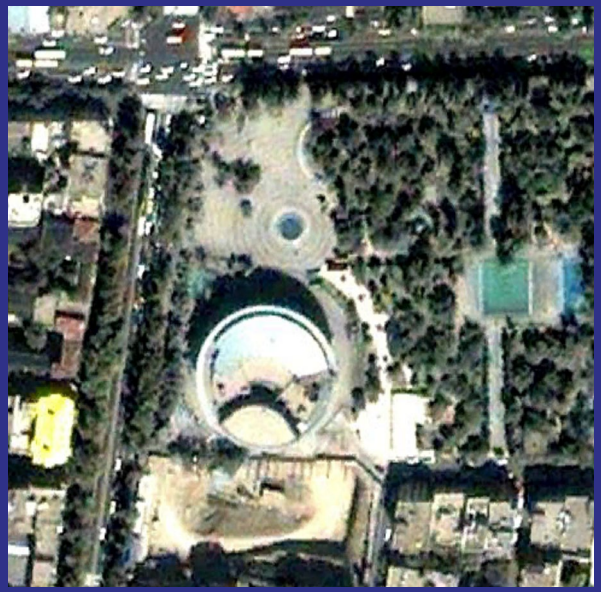
Results

Representative Tweets

Tehran/Valiasr Street Life & Nostalgia	**City Theater Metro & Underpass**	**Grand Bazaar & Market Shopping**	**Performing Arts & Festivals (CT)**
"How tight I miss the Valiasr and Vanak"	*"I lost myself in the city theater underpass again!"*	*"Ta'zyieh-khani (Passion Play) of Imam Hossein is a ceremonial art of Islam. Tehran Grand Bazaar, Sabzeh Meydan."*	*"City theater was the most peaceful space for my tired soul and body in the midst of Tehran's busiest place[...]"*
Public Monuments	**Tajrish-Valiasr Walks**	**Valiasr Street Connectivity & Length**	**Valiasr-Tajrish Tree Preservation & Urban Ecology**
"Installing Arash's statues is really one of the only nice things they've done in Vanak."	*"Can't wait for April 27th and go to Tajrish, and then let me go down so far that I don't feel my feet anymore."*	*"I would like to walk from the Mellat Park to Vanak."*	*"179 trees are dried out and will be cut down in Vali'asr."*
Seasonal Walks (Autumn in Valiasr)	**Emotional Attachment to Tajrish**	**Metro Station Entrances**	**Urban Management & Heritage Protection (City Theater)**
"For everyone it is mandatory to come to Valiasr street in Tehran in the autumn, it will revive you."	*"That's it! Now that I'm alone, gotta walk to Tajrish and have a delicious ice cream. Then walk a little bit to make it to a café in Ferdows garden. I spend the winter with these [song]."*	*"Metro City theater at 7pm = the decline of humanity"*	*"Tehran City-theater fountain was destroyed by the municipality."*



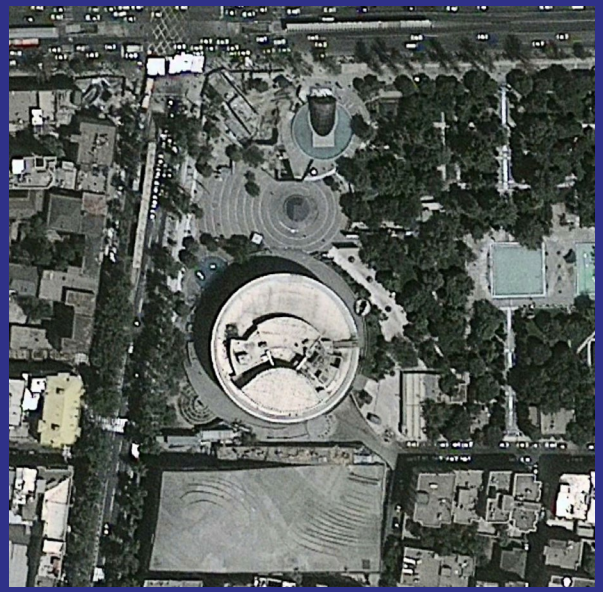
2000



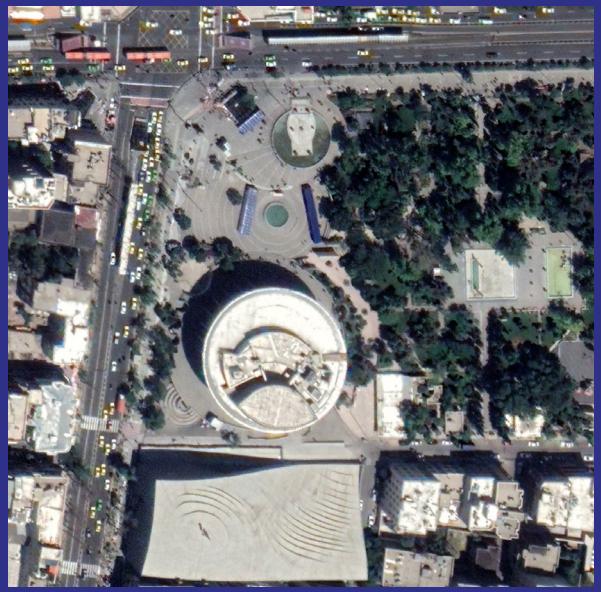
2005



2009



2013



2018



2025

Google Earth Engine, 2026

Methodology

Key Steps

Data collection, preprocessing, analysis & visualization

Data Scraping

~8k tweets

- **Scraping texts on X with keywords using Apify**
- **Timeline of 2022 to 2026**
- **City Theater & Tehran scales**

Preprocessing

~6.7k tweets

- **Removing URLs, hashtags, tagging, stop words, etc.**
- **Deduplication**
- **Non-Farsi Tweet removal**

Word Embedding

94 Overall Topics

- **ParsBERT model run for Farsi NLP**
- **Topic distribution**
- **Tweet probability weights**
- **Top terms per topic**

Sentiment Analysis

2948 Spatial Tweets

- **BERT algorithm run**
- **Sentiment valuing into + / – / o**
- **Sentiment scoring from 0 to 1**

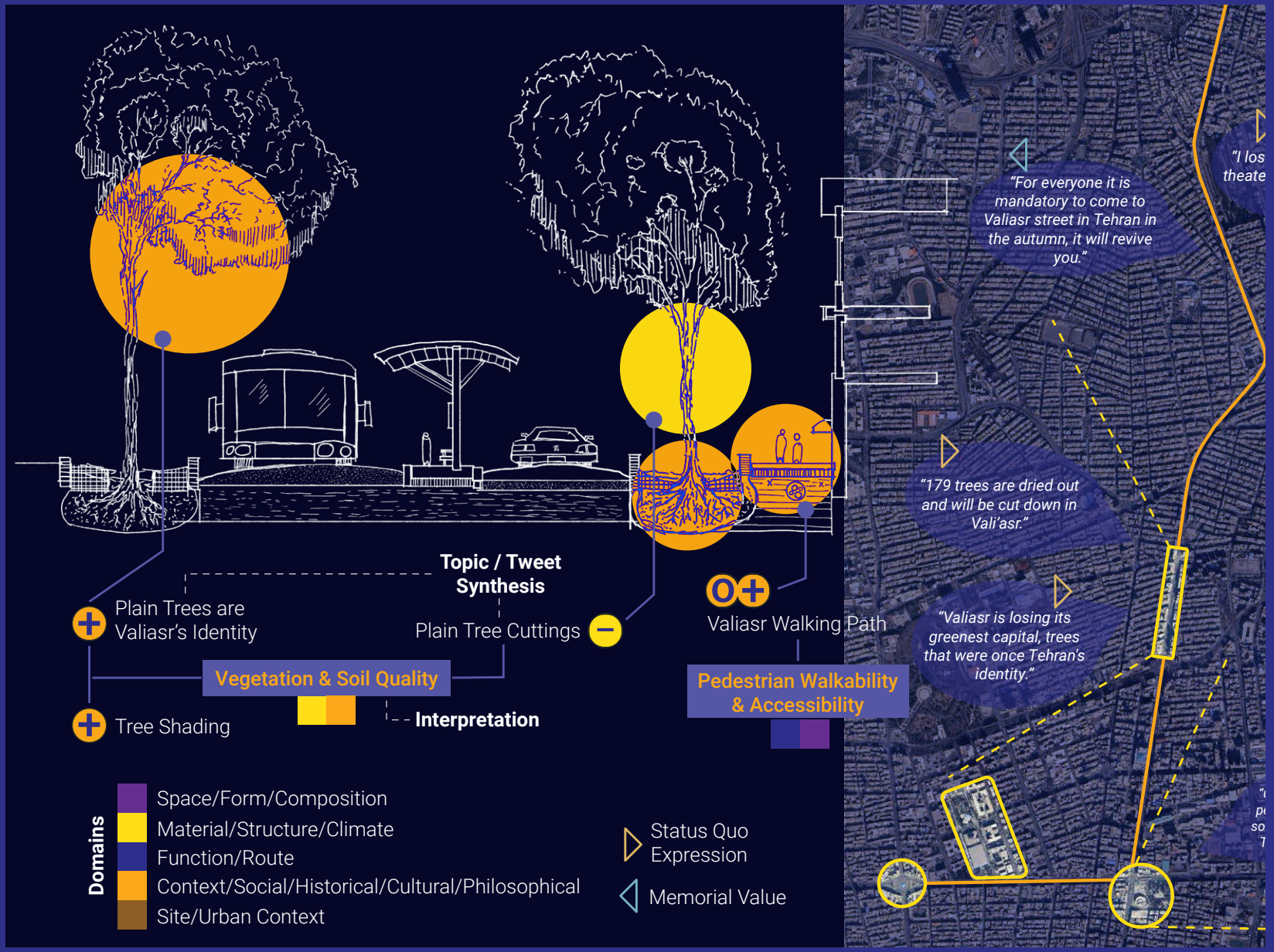
Aggregation

13 Localised Spatial Topics & 1794 Tweets

- **Topic/Sentiment Value co-occurrence matrix in two scales and timelines**
- **Three key place picking based on place-topic matrix**

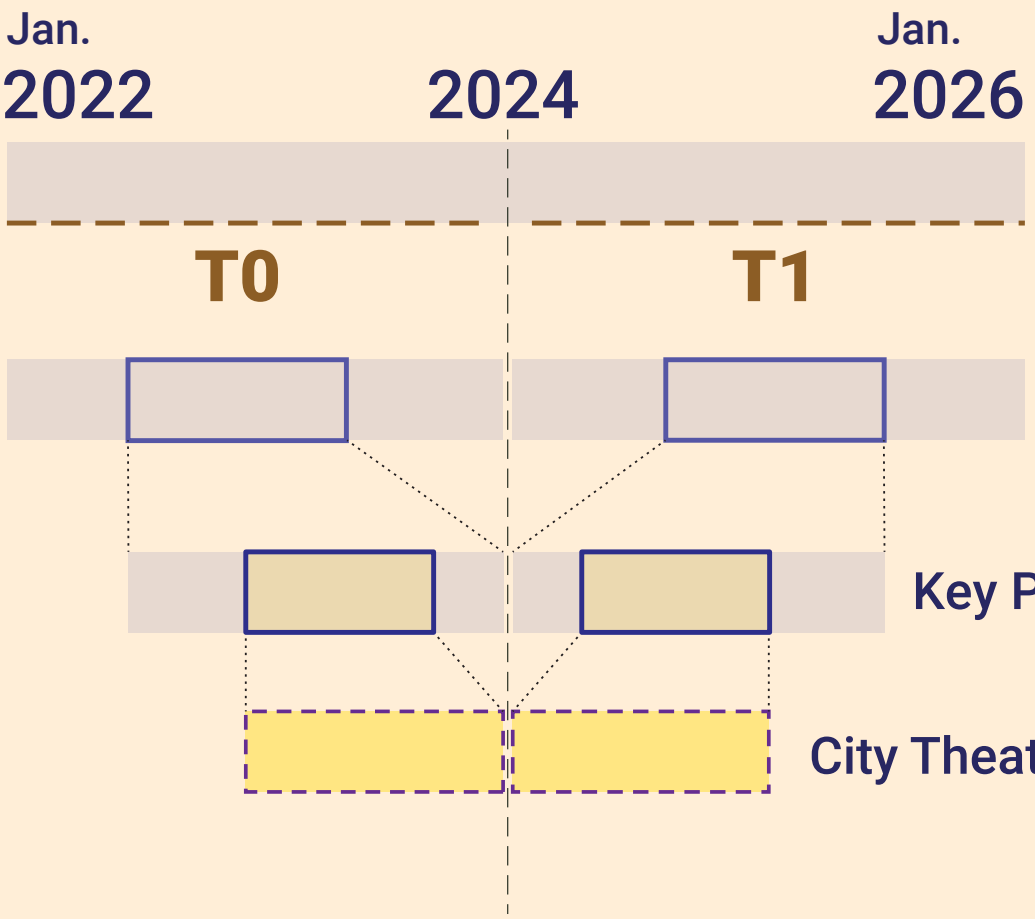
Design Framework

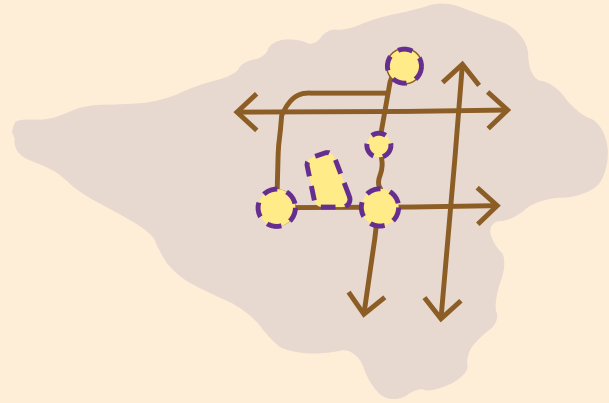
How it's applied

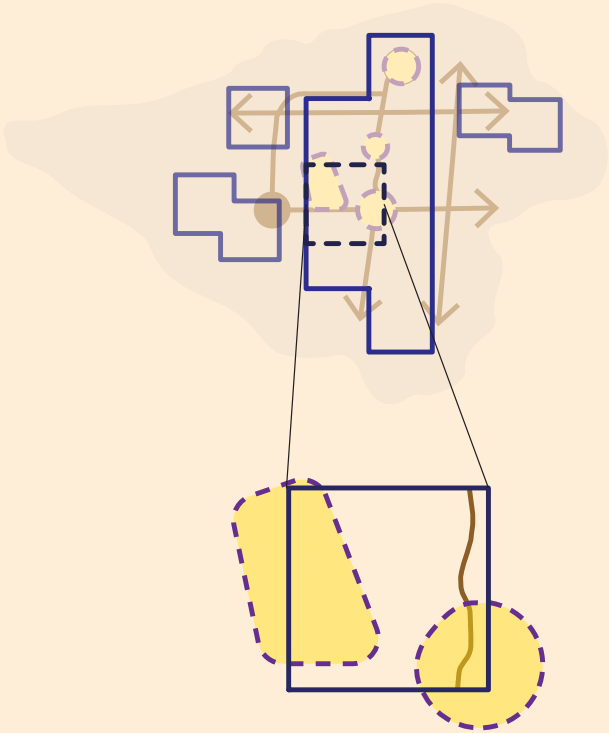


Scope

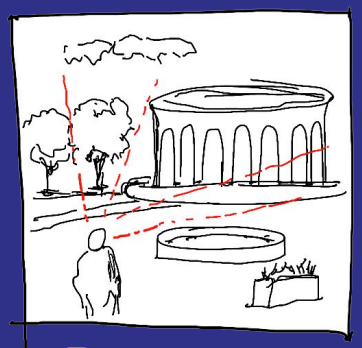
Timeline & Scales



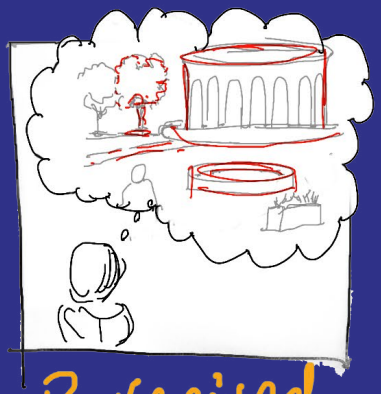




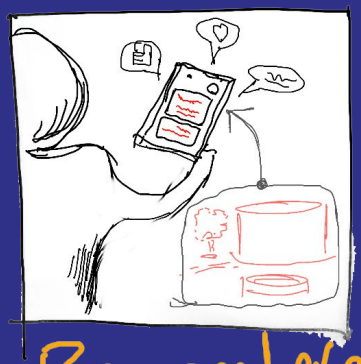
Literature Review



Space



Perceived Space



Remembered Space



Digital (Shared) Space

Objective
Material

Subjective
Immaterial

Right to the City (Right to the Memory)

Sense of Place

Perceived Urban Space

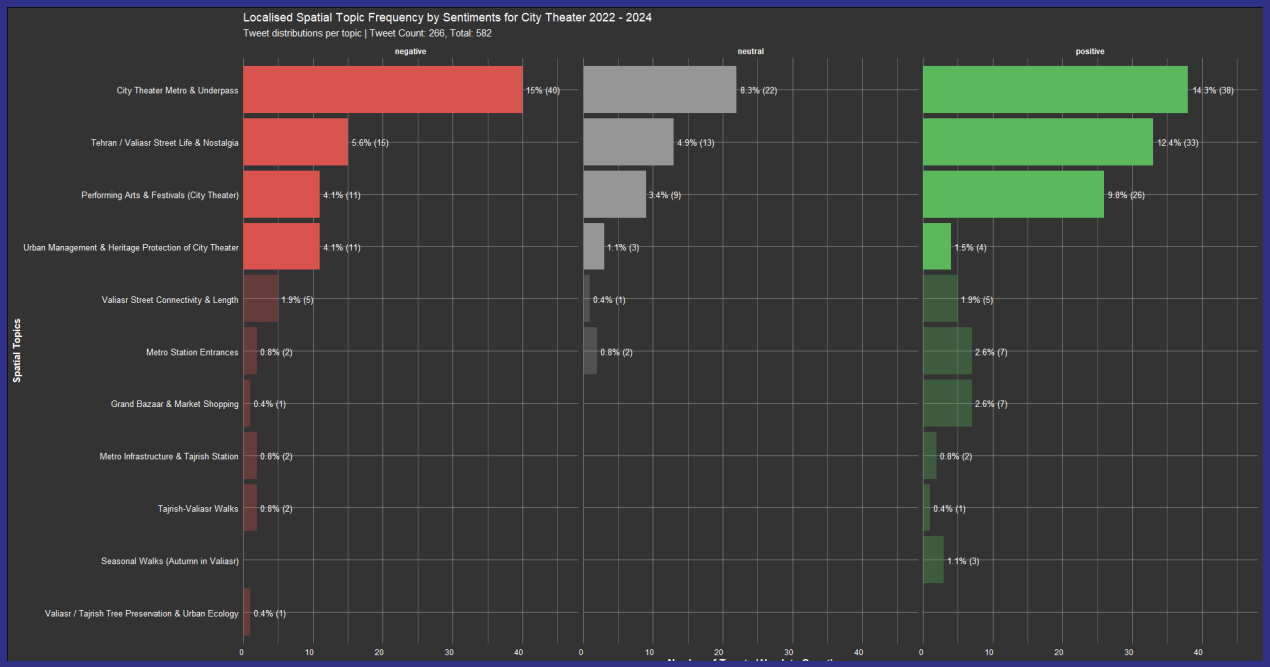
Basic Emotions

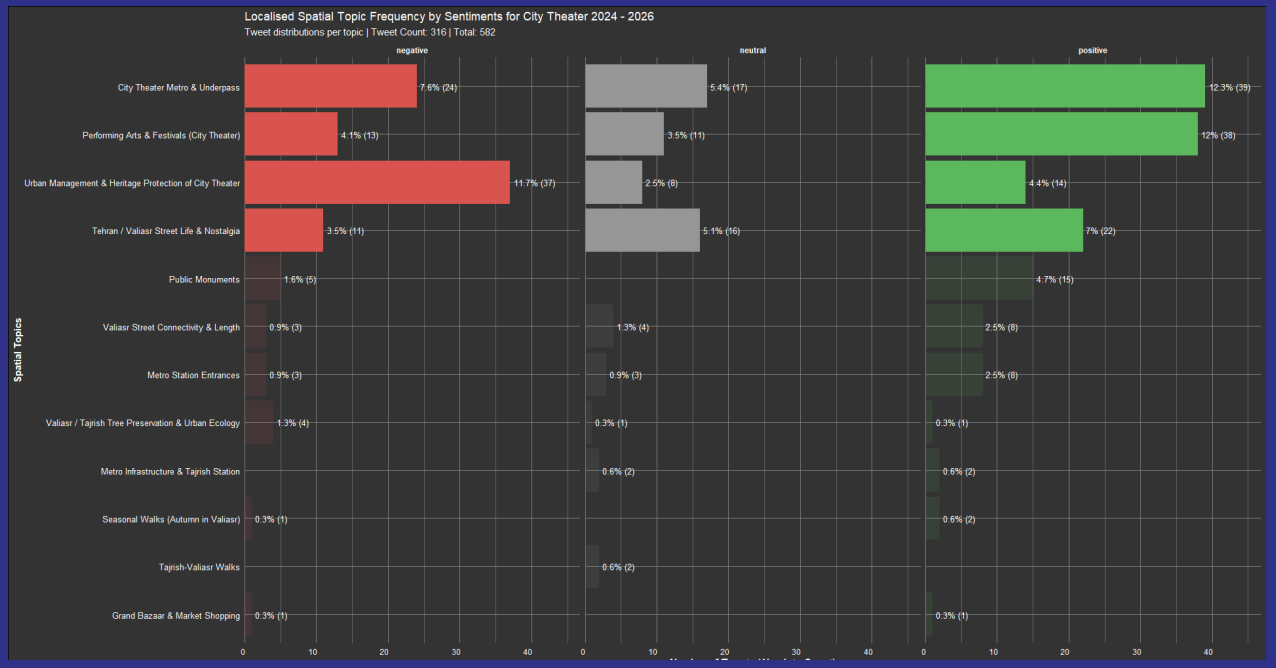
Digital Space (Archival Memories)

Public Engagement (Digital Participation)

Appendix

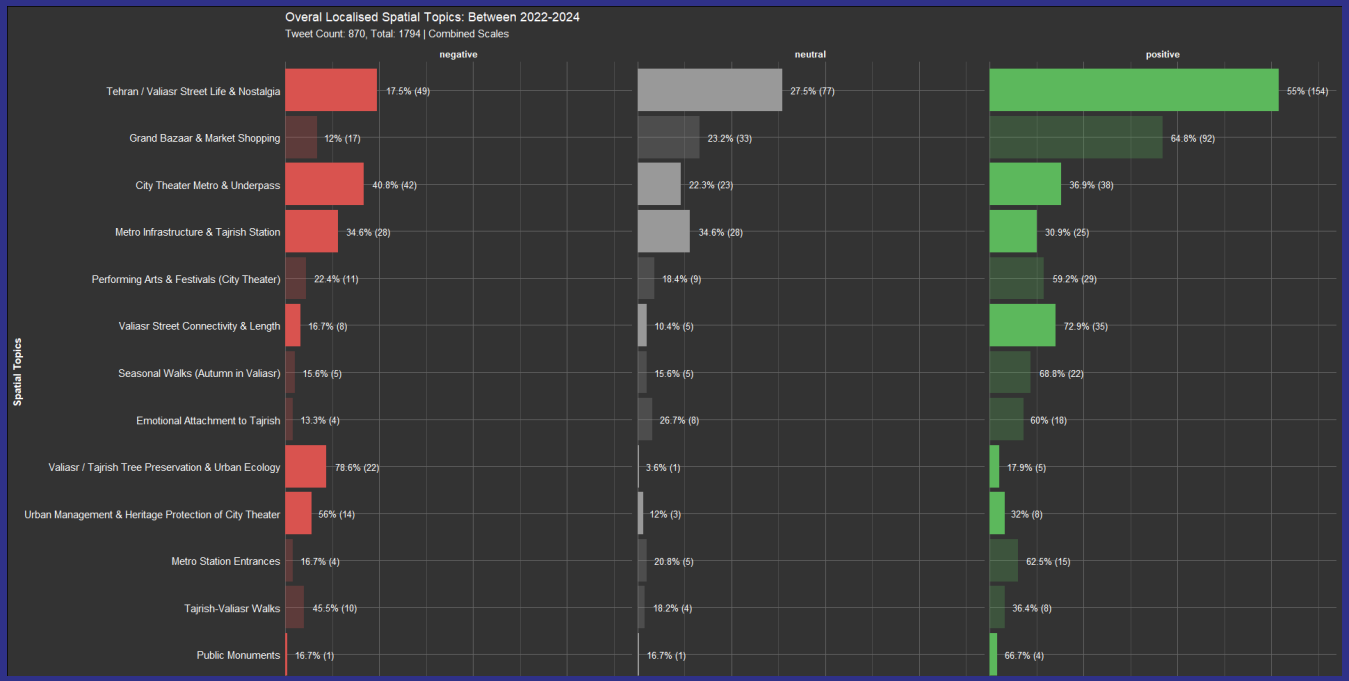
CT ‘22-26

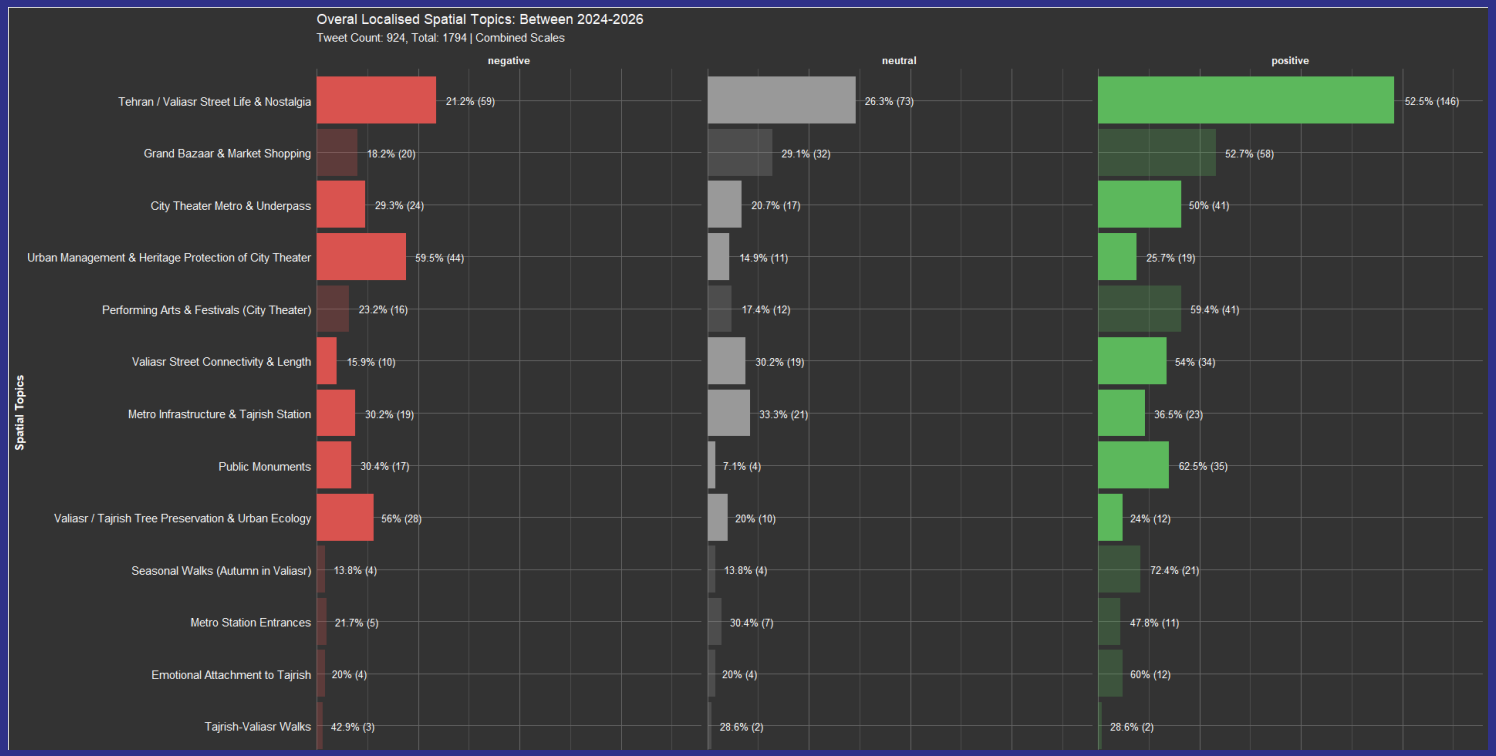




Appendix

Overall ‘22-26





Appendix

Location Quotient = (% of Topic A in City Theater) / (% of Topic A in all of Tehran)

If LQ>1:Topic is specialized to CT

If LQ<1:Topic is deficient or not relevant to CT

Tweet count per topic = $Topic_C$
Total tweet count per timeline = $Topic_T$
Average Sentiment Score = $Score_{Avg}$

Proportionate Weight (Topic Share) = $Topic_C$ / $Topic_T$
Weighted Normalized Sentiment Score = $Score_{Avg}$ × Topic Share

Validation

Chi-square

Significance

		Sentiments			X^2	P-Value
		Positive	Neutral	Negative		
City Theater	Before 2024	90	50	126	**32.602**	8.331e-08 [0.00000008331]
	After 2024	102	64	150	**35.266**	2.198e-08 [0.00000002198]

		Sentiments			X^2	P-Value
		Positive	Neutral	Negative		
Tehran	Before 2024	125	152	327	**119.47**	2.2e-16 [0.00000000000000022]
	After 2024	151	152	305	**77.51**	2.2e-16 [0.00000000000000022]