



Unveiling Urban Stress using Tweets:

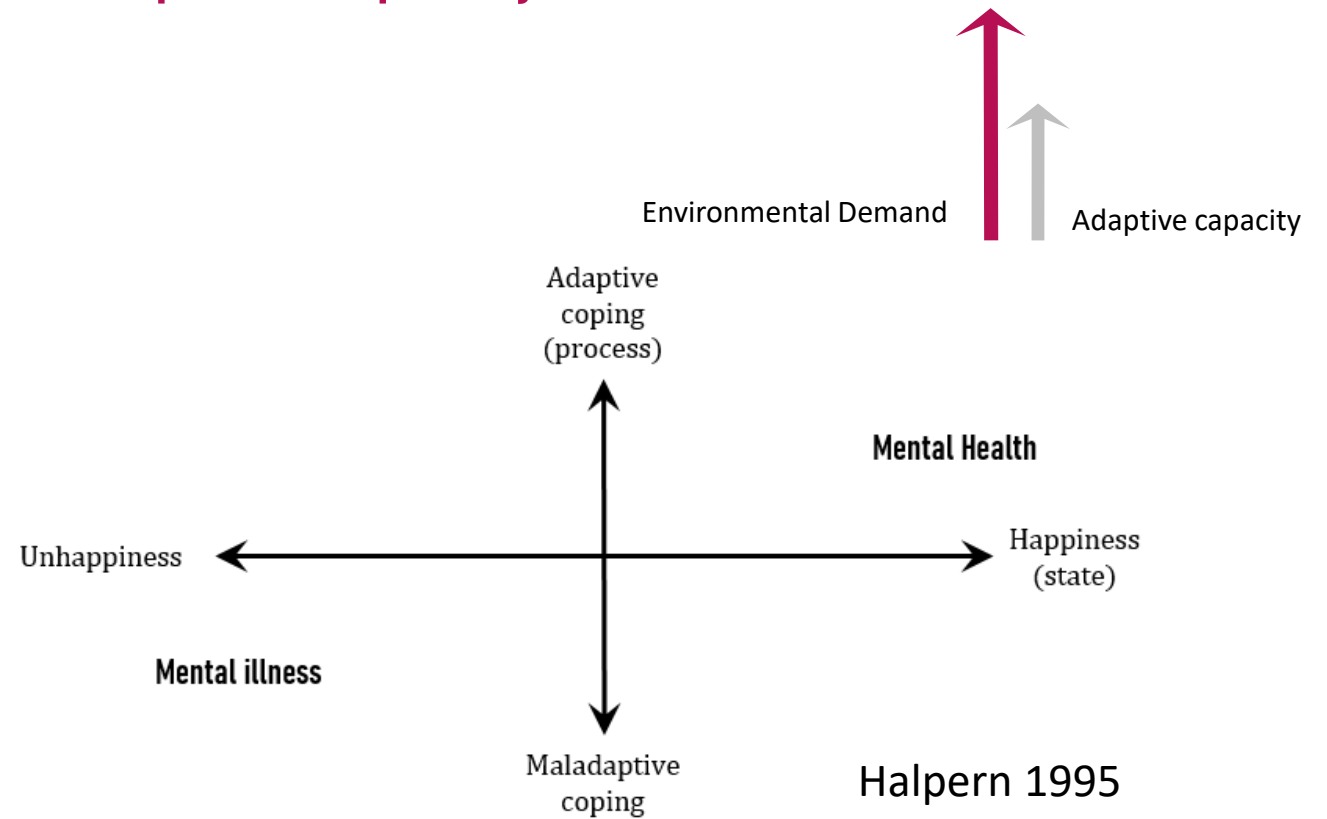
Modelling Impact of Built Environment Stressors on Mental Wellbeing

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What is stress?



Stress is a psychological reaction of individuals when they perceive the environmental demand exceeds their adaptive capacity



**Why is it
important in the
urban context ?**

Different type of stress experienced ?

	Minor	Major
Acute	Daily hassles, e.g., traffic, problem with work, etc.	Significant life events, e.g., death of close friend or family
Chronic	Environmental stressors e.g., noise, pollution, crowding, etc.	On-going difficulty, e.g., long-term health issues, poverty, etc.

Table 1 Different types of stress in the lifetime of a person [6].

Conflicting Theory

Domain of Psychology

David Halpern 1995 –
Mental Health and The Built
Environment: More than bricks
and Mortar ?

G.W Evans 2003 –
Housing and Mental Health: A
Review of the Evidence and a
Methodological and Conceptual
Critique

Chu et al. 2004 -The
impact on mental well-being of
the urban and physical
environment: an assessment of
the evidence .

01 ENVIRONMENTAL STRESSORS

WEATHER

NOISE

POLLUTANTS

02 SOCIAL STRESSORS

CROWDING & HIGH DENSITY
HIGH RISE BUILDINGS
FEAR OF CRIME
NEIGHBORHOOD QUALITY
LIMITED SOCIAL
PARTICIPATION

Conflicting Theory

Urban Planning

Frumkin et al 2004

**Urban Sprawl and Public Health:
Designing, Planning, and
Building for Healthy
Communities**

Putnam 2000 The
Collapse and Revival of
American Community

Strum & Cohen 2004.
Suburban sprawl and physical
and mental health

03 TRAFFIC STRESSORS

UNPREDICTABILITY
LACK OF CONTROL

04 SOCIAL STRESSORS

REDUCED SOCIAL CONTACT
LIMITED PHYSICAL
ACTIVITIES
UNPLEASANT BUILT
ENVIRONMENT

H. People are less stressed in areas with a higher degree of urbaneness.

Built Environment

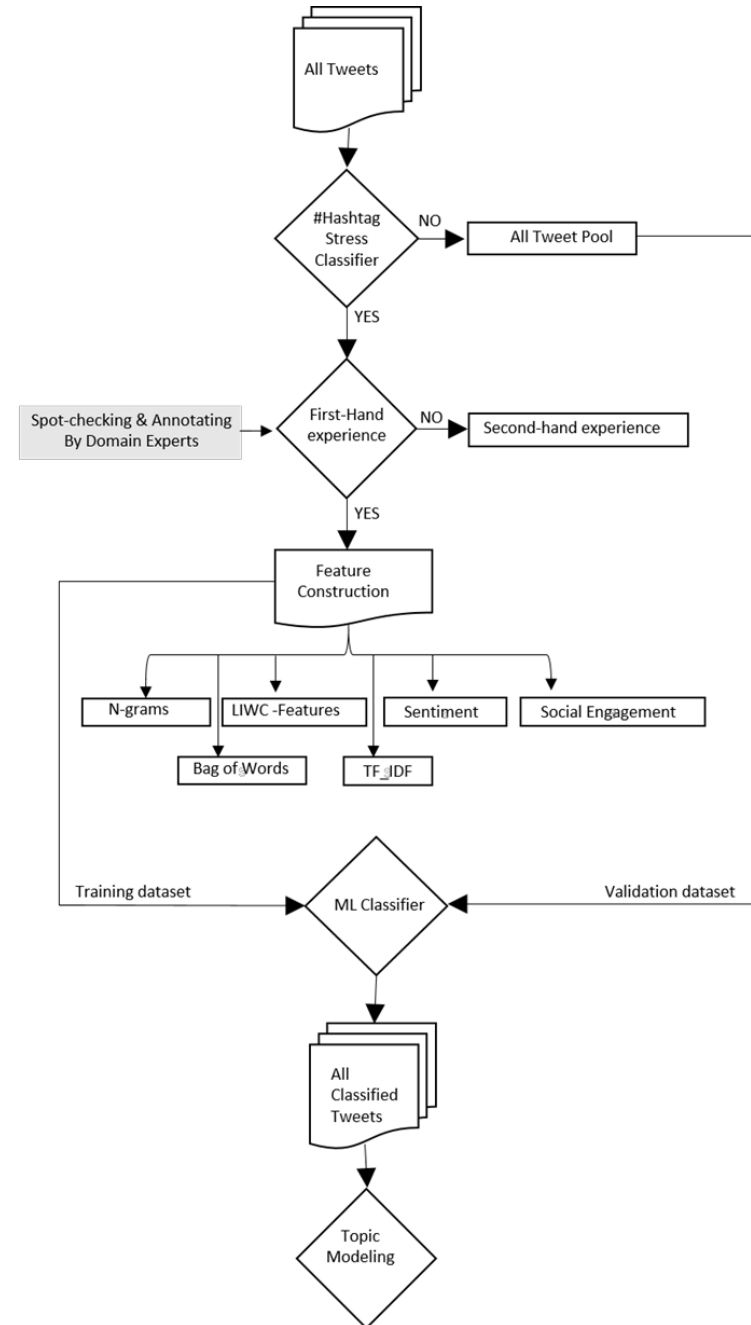
Variables

Considered

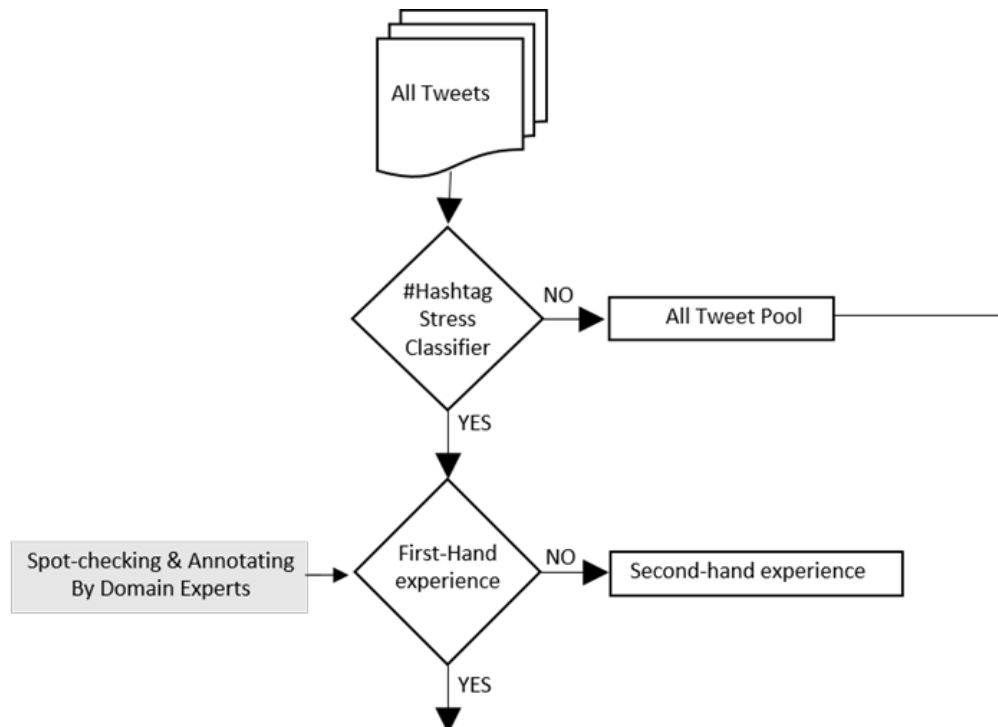
Land Use Diversity
Ground Coverage (setback)
Floor Area Ratio (density)
Percent Gridded Street Network
Access to MARTA Train Station

Building the Stress classifier

We used Twitter Data to understand the distribution of urban stress



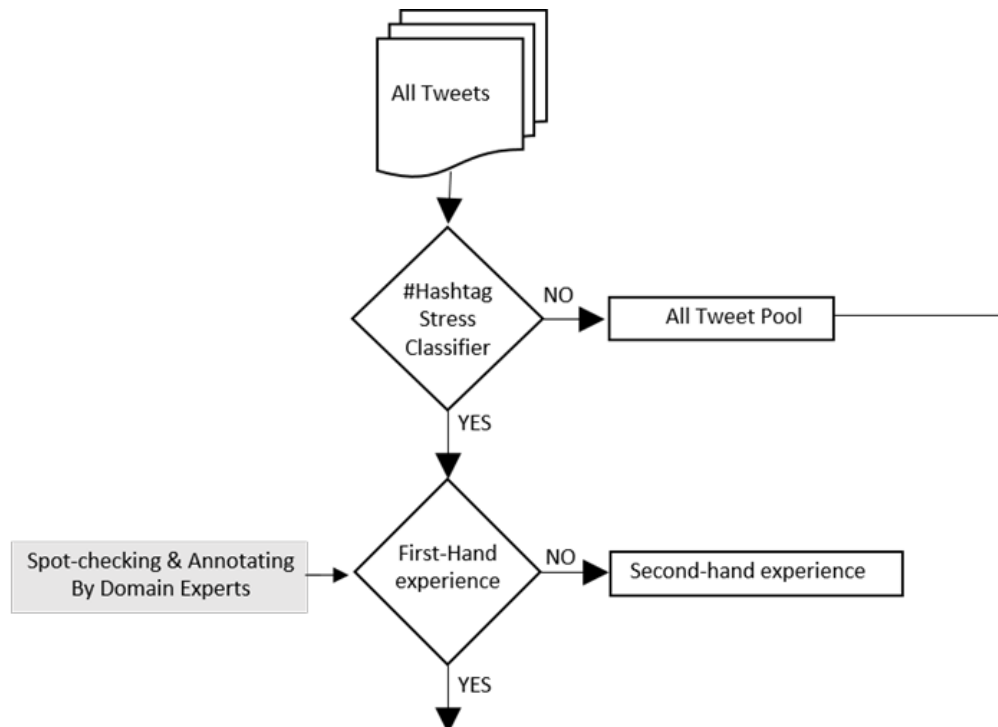
Selecting First-hand stress Tweets



Stress

#mentalhealth	#wellness
#depression	#today
#health	#care
#anxiety	#parenting
#ptsd	#mentalhealthmatters
#mentalillness	#thanks
#work	#life
#hope	#issues
#time	#stress
#recovery	#read
#person	#adhd
#alzheimers	#pain
#tumblr	#lonely
#mood	#alobe
#heartbroken	#sadness

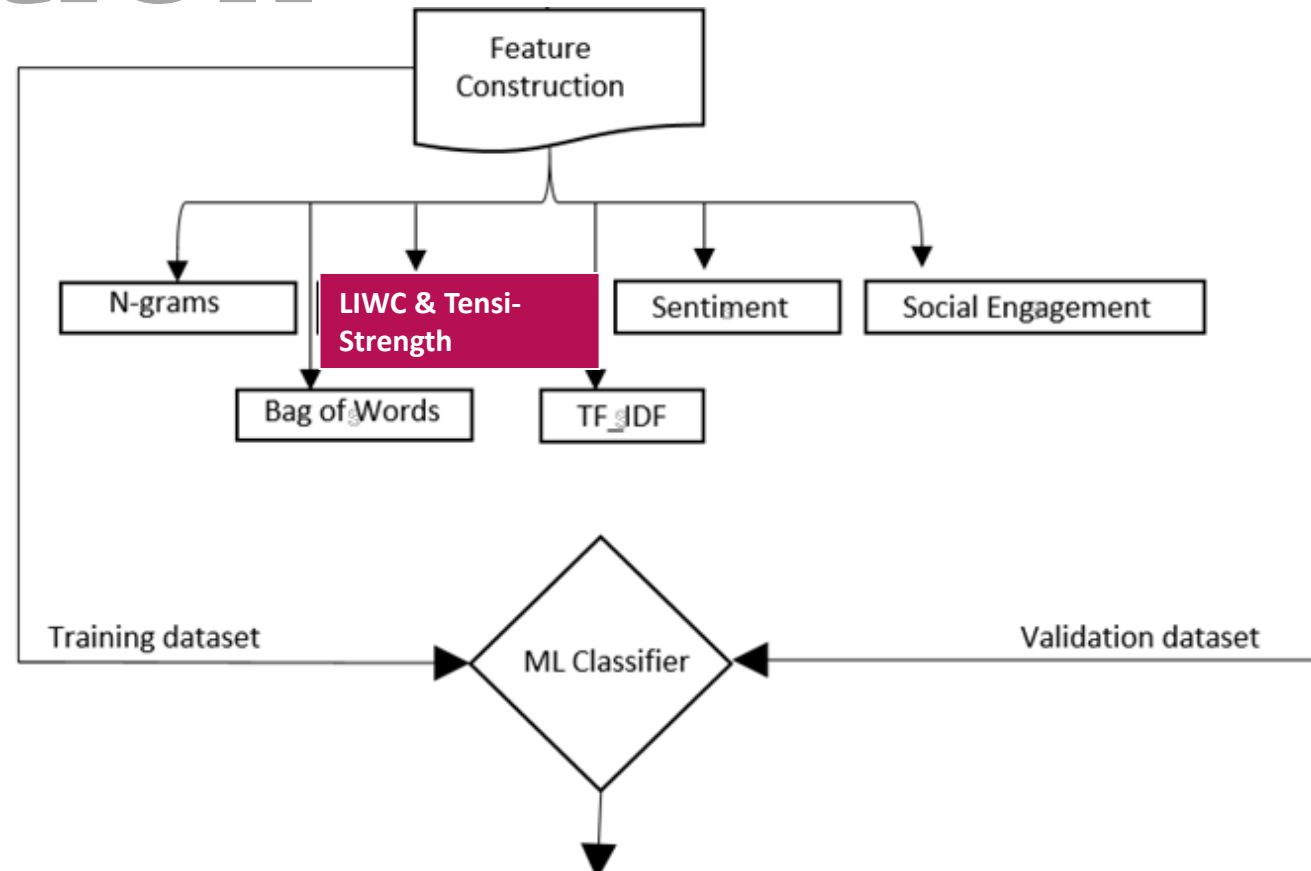
Selecting First-hand De-stressing Tweets.



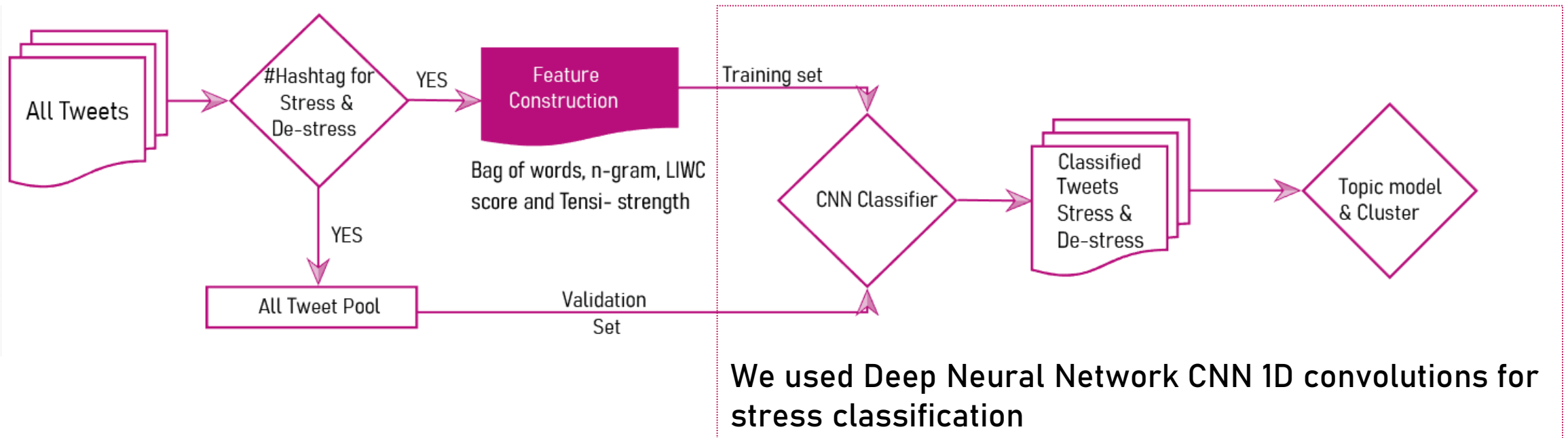
De-Stress

#destress	#love
#relax	#spa
#selfcare	#mindbody soul
#massage	#wellbeing
#meditation	#happiness
#relaxation	#health
#mindfulness	#egai
#stressrelief	#breathe
#wellness	#stressmanagement
#mentalhealth	#calm
#stress	#healthylifestyle
#yoga	#holistichealth
#unwind	#tired
#selflove	#therapeuticmassage
#massagetherapist	#bhfp

Feature construction



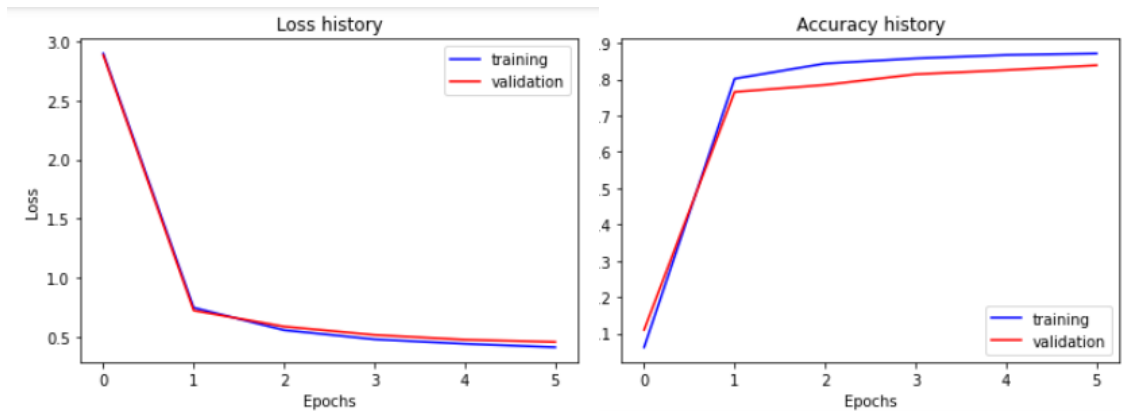
Training the classifier



Results from the Tested model

Tweets used : 170,000
Training data: 40,000

		Predicted Class	
		De-Stress	Stress
True Class	De-Stress	113,310	8690
	Stress	597	7,403



Validation set confusion matrix

	Accuracy	Precision	F1-score
Stress	0.94	0.97	0.95
De-stress	0.93	0.94	0.92

Mapping De-Stress Tweets

Low Density High Density

Buckhead
Village



@buckheadvillagedistrict

Midtown



@midtown_atl

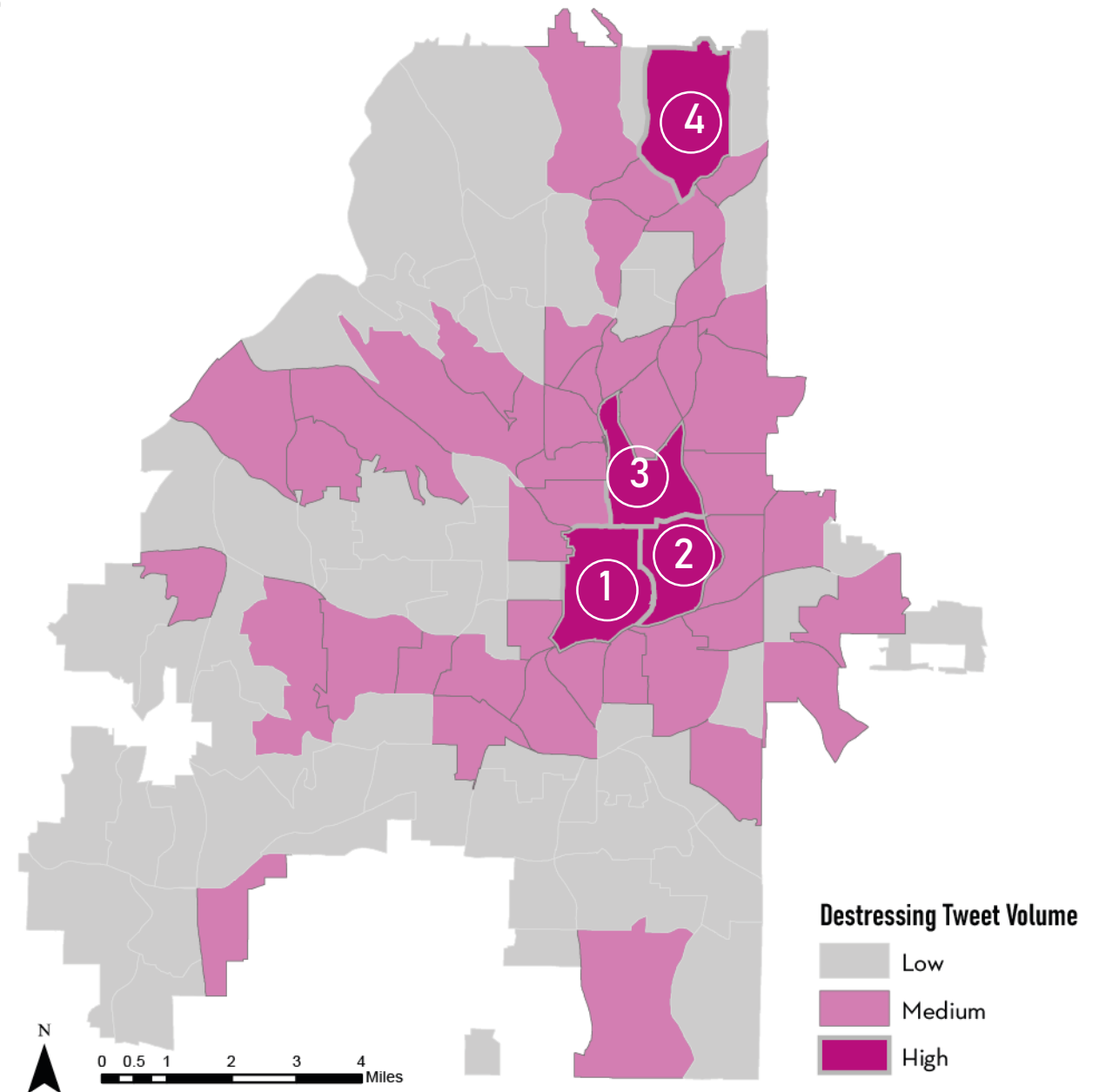
Downtown



@downtownatlanta

ATL Neighborhoods Reporting Highest De-stressing Activities

1. Downtown & Castleberry Hill
2. Midtown
3. Buckhead
4. Old fourth Ward

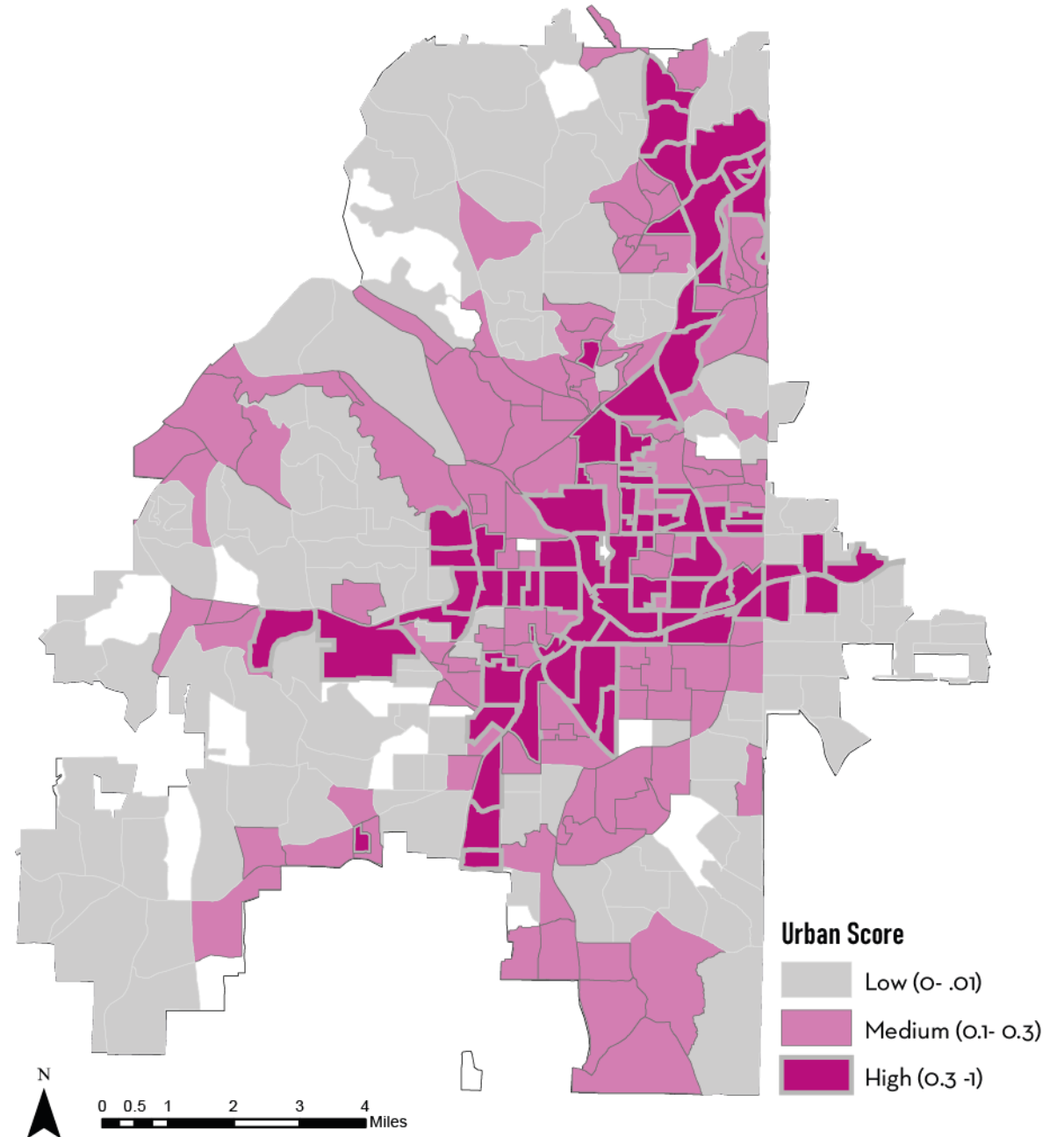


Mapping Urban Score

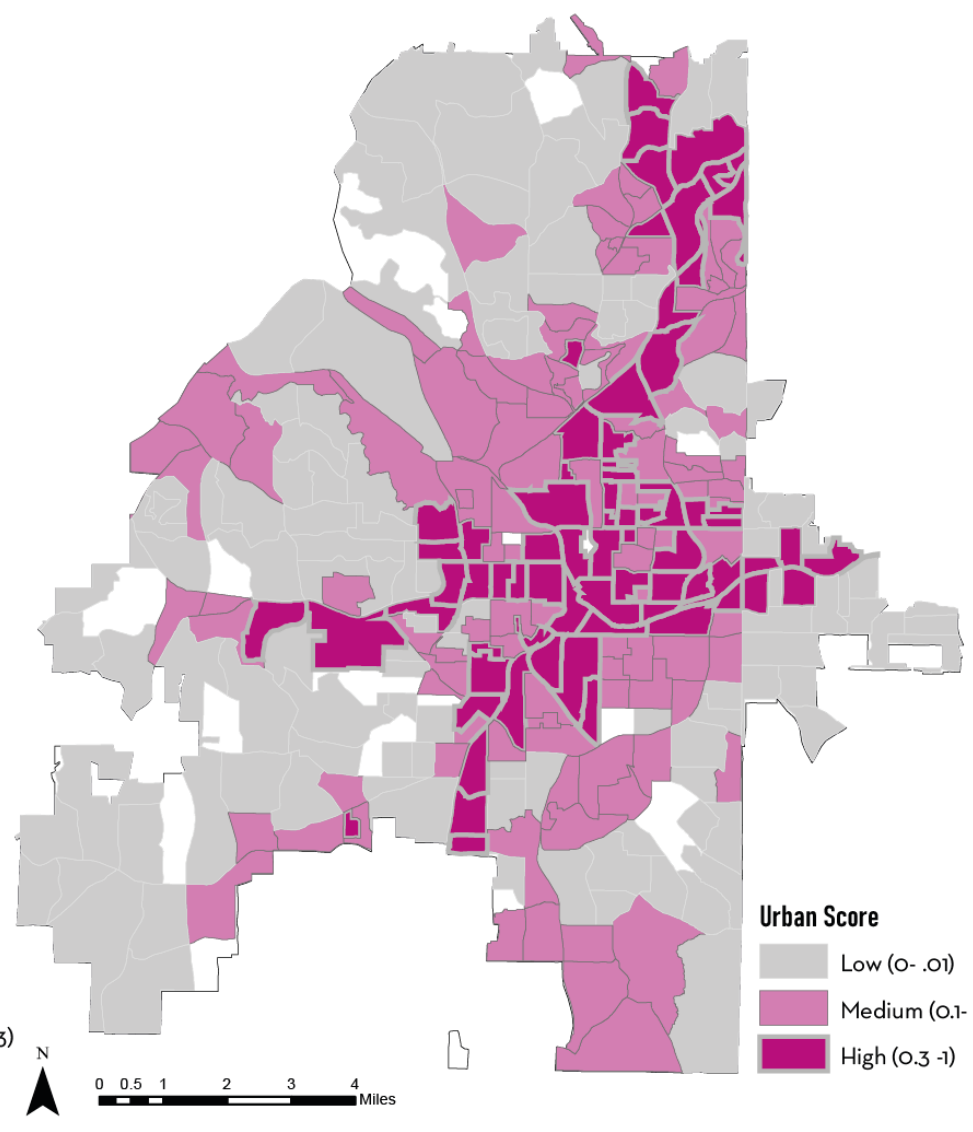
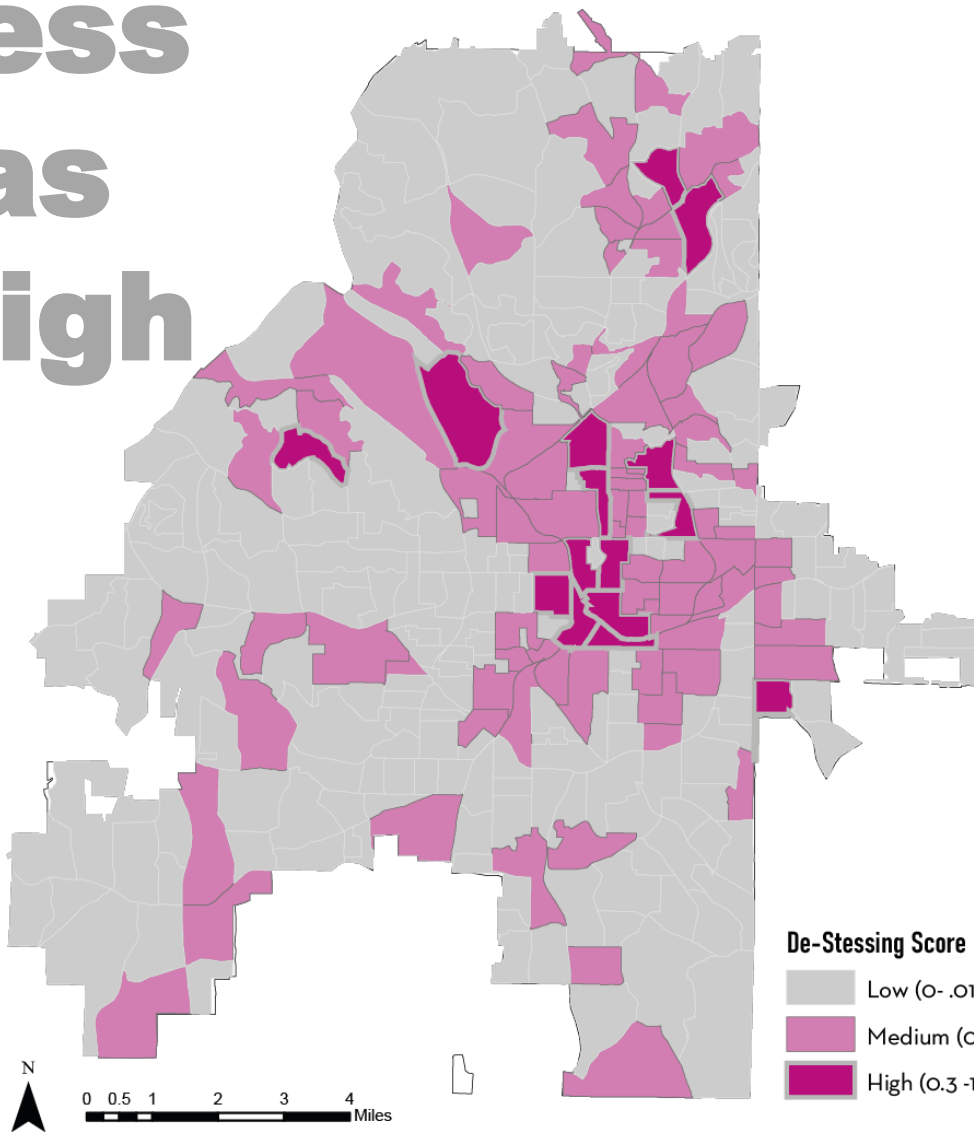
Map of Atlanta Block Groups

The urban score is a composite score generated using

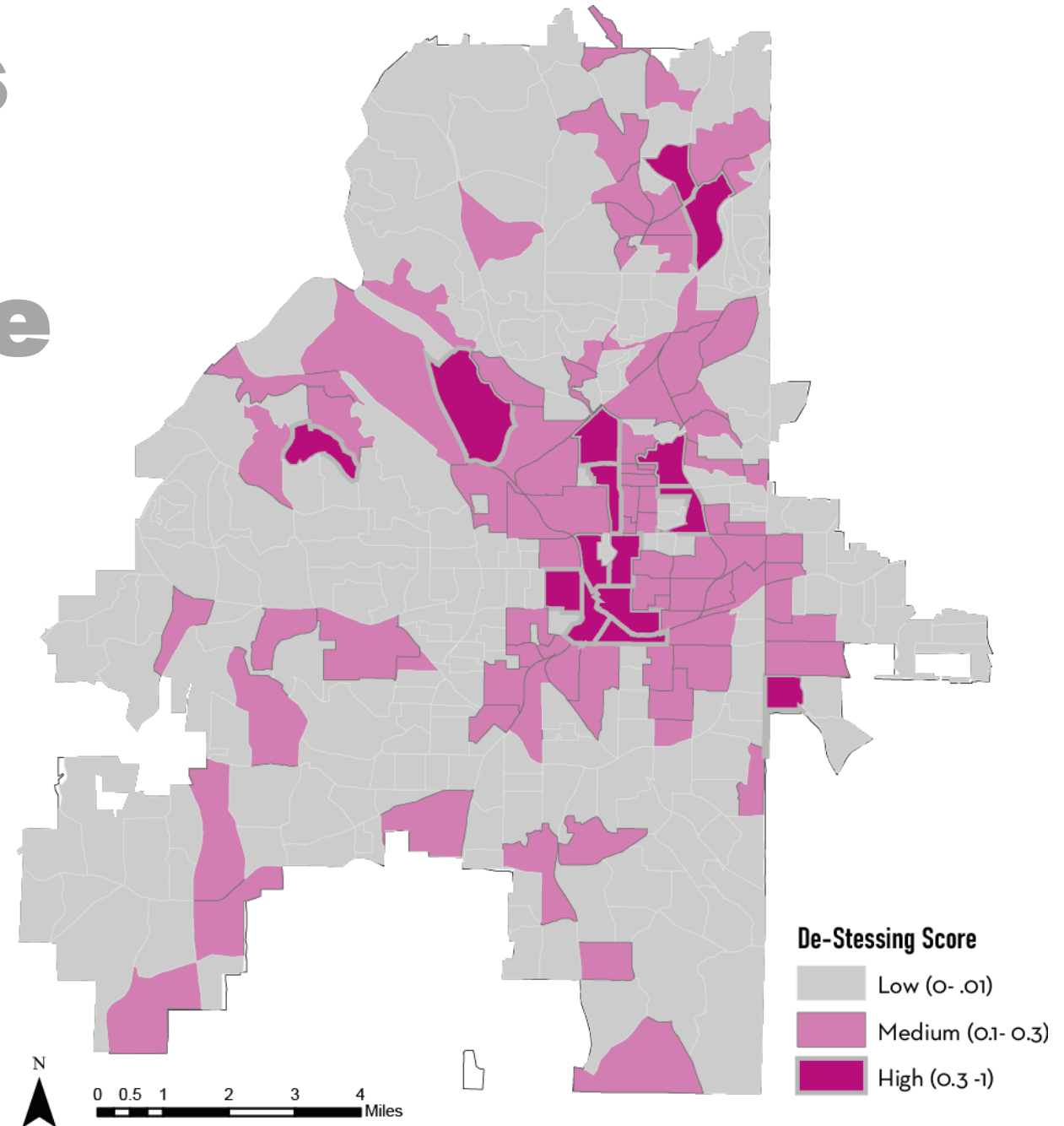
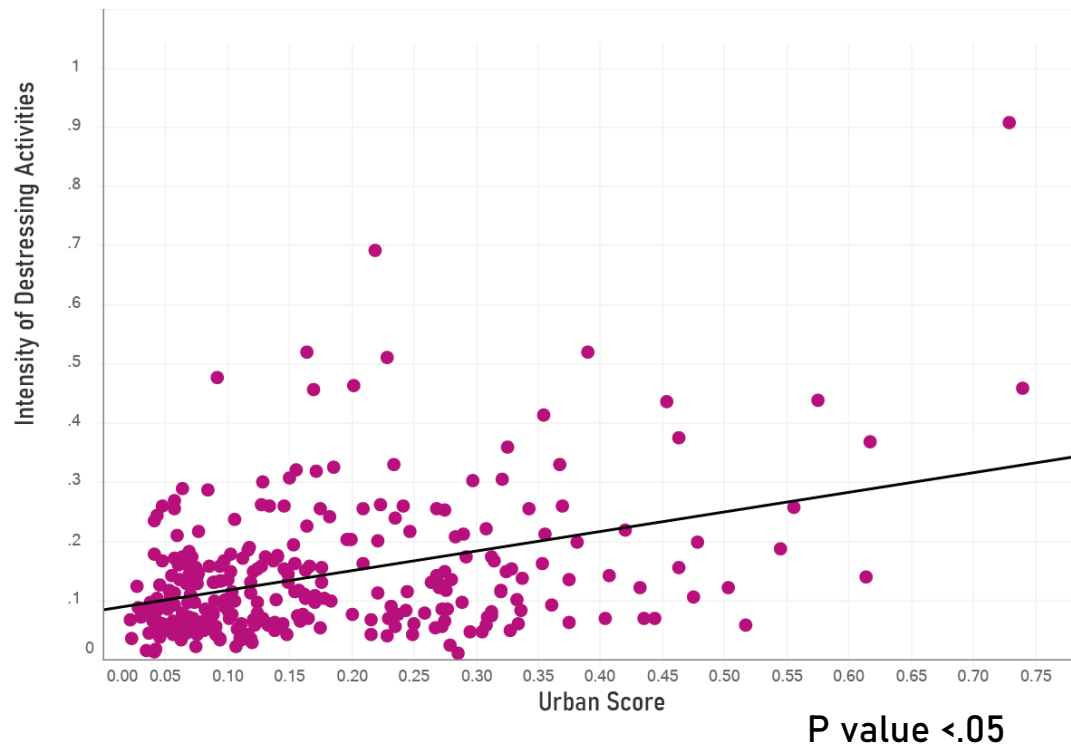
Land Use Diversity
Ground Coverage (setback)
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People De-stress in Areas with High Urban Score



People De-stress in Areas with High Urban Score



Topic Clusters

Cluster (group)

- City & Public Amenities
- Events & games
- Food and Drinks
- Photography
- Relaxation

City and Public Amenities - People describes how happy they are with the public amenities (park, trail, plaza, restaurants, museums) in the city.

Games and Events - People reported visiting weekend events, games, etc. for fun

Food and Drinks - People enjoyed drinking beer , wine or eating food on certain occasions.

Photography- People reported taking pictures or videos, and shared their Instagram posts.

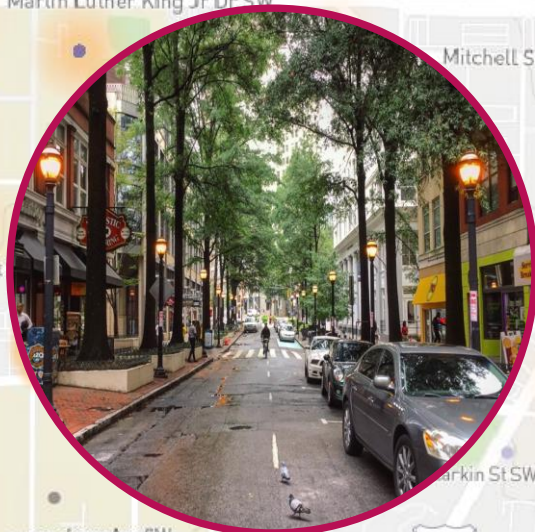
Relaxation - People did various activities like yoga, strolling , taking a walk or even engaging in activities like gardening watching, television , cooking.

Getting insight from the Topic Clusters

In Atlanta people involve in more amount of de-stressing activities during the afternoon



Downtown



Cluster (group)

- City & Public Amenities
- Events & games
- Food and Drinks
- Photography
- Relaxation

Ground Coverage **61%**
FAR Average **4.5**
Land Use Diversity **High (0.6)**
Urban Score **.6**

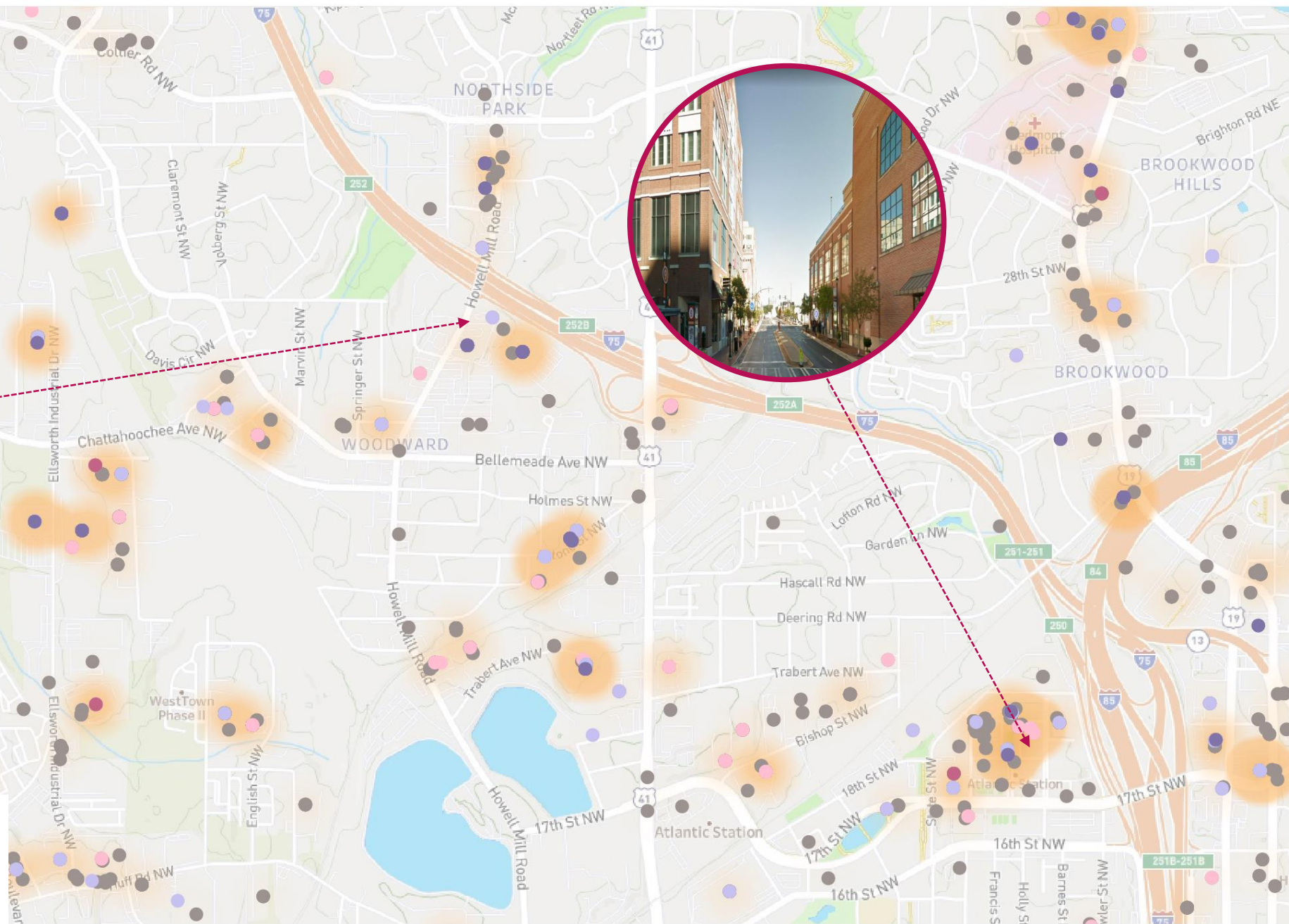
Hill Park



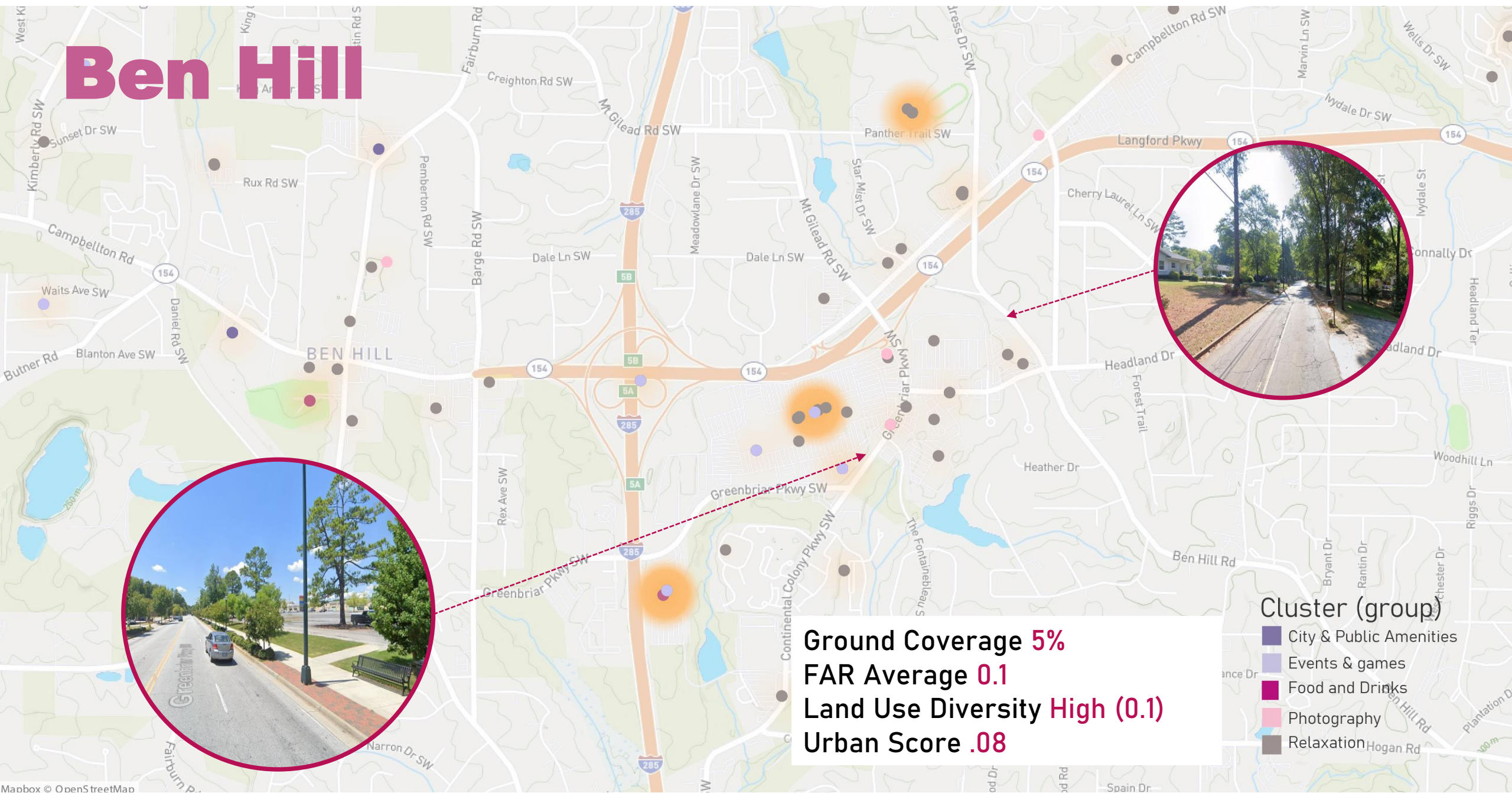
Cluster (group)

- City & Public Amenities
- Events & games
- Food and Drinks
- Photography
- Relaxation

Ground Coverage **18%**
FAR Average **1.8**
Land Use Diversity **High (0.3)**
Urban Score **.18**



Ben Hill



**H. People are less
stressed in areas
with a higher
degree of
urbaneness.**

Findings:

People engage in de-stress in neighborhoods with higher urban score.
i.e. neighborhoods with higher building density, smaller block sizes, higher proportion of gridded streets, and high land use diversity.

Future work in progress

Findings:

Adding fine grain Built environment and socio economic variable.

Assessing the stressed Tweets their topics.

Comparing more cities

Research Implication

Can be used in the development of audit tool / check list for planners and designers

Provide cues for public awareness

Overall aims to encourage reduction in the mental health cost burden through investment in public amenities