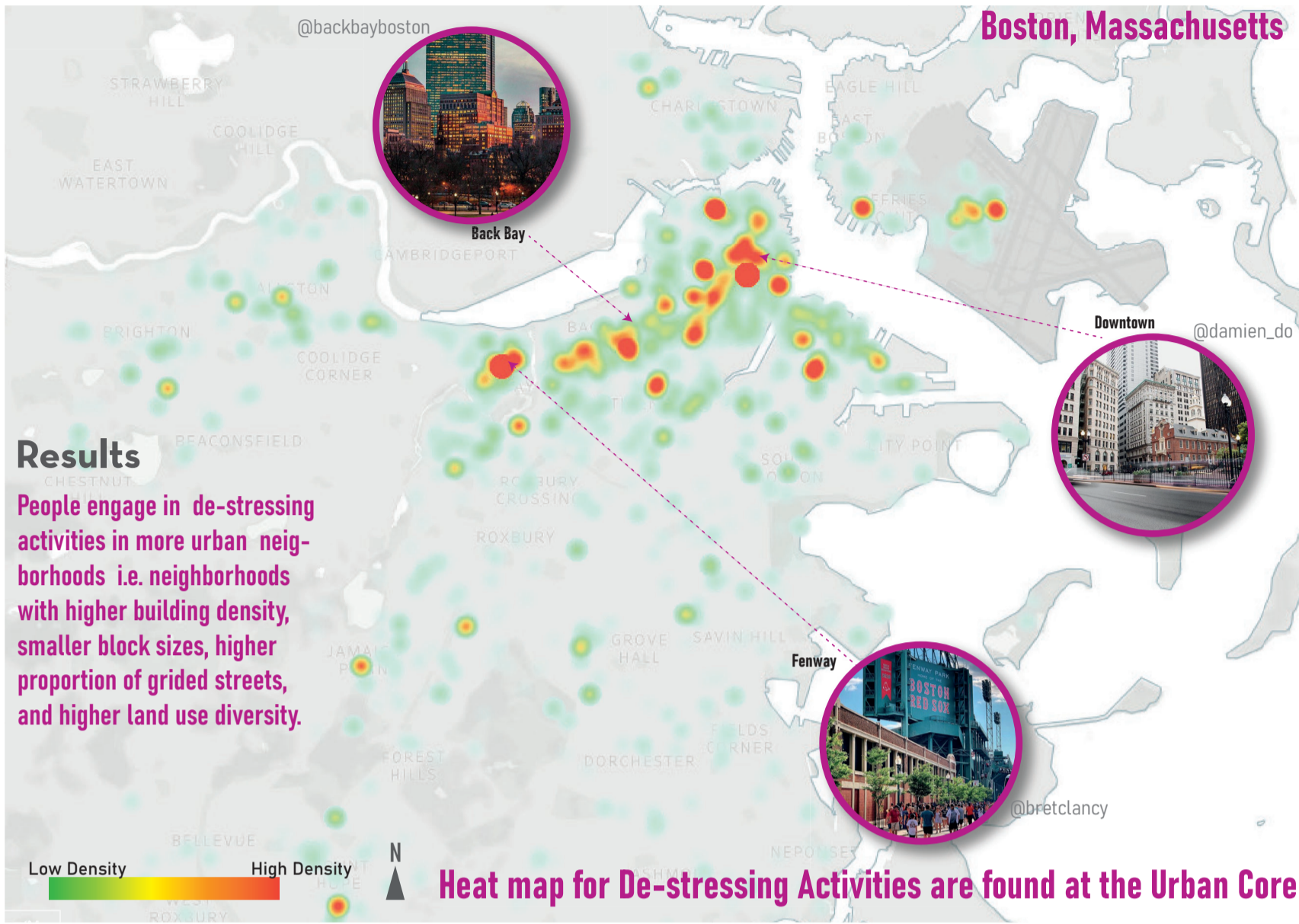# Does choice of day-to-day activity location impact Mental Well-being? Mapping people's activities and associated stress levels from Tweets

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Contact Info : florina.design@gatech.edu

## Boston, Massachusetts

@backbayboston

Back Bay

Downtown
@damien_do

Fenway

@bretclancy

### Results

People engage in de-stressing activities in more urban neighborhoods i.e. neighborhoods with higher building density, smaller block sizes, higher proportion of grided streets, and higher land use diversity.

Low Density — High Density

**Heat map for De-stressing Activities are found at the Urban Core**

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There is a rising burden of urban mental health disorders that are attributed to urban living (Peen, Schoevers, Beekman, & Dekker, 2010). Apart from economic inequality, noise, and pollution in cities, studies have shown that increased urban density (often measured by population density) and crowding may have an adverse impact on mental well-being. Lack of control over one's environment in dense urban areas and lack of social contact in high-rise residents are some of the causes of stress in dense urban areas (Chu, Thorne, & Guite, 2004). Mental health surveys have often shown conflicting results on the impact of density and crowding. **Our study shows that people de-stress (relax) at the high density urban core.**

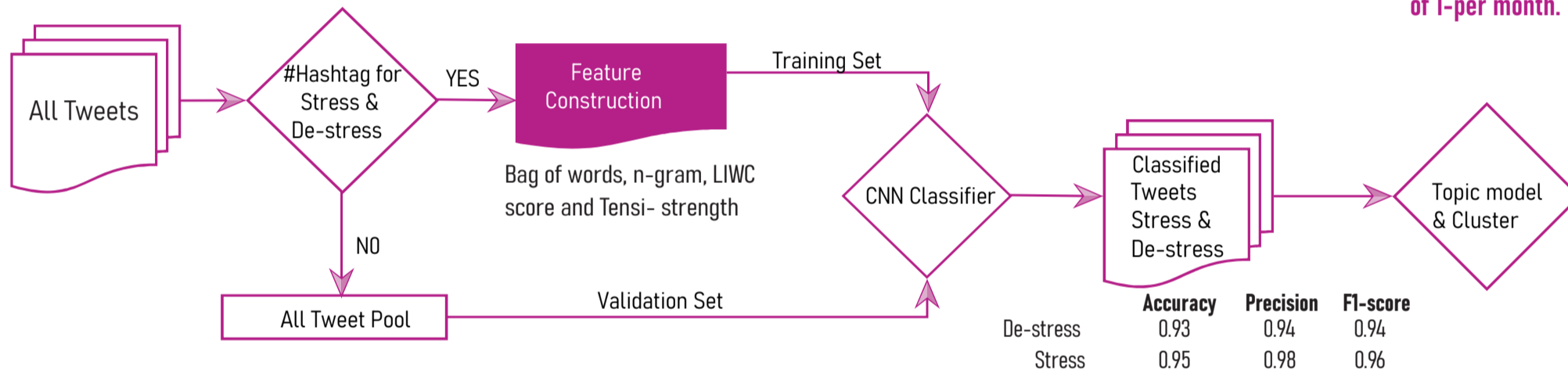## Top 5 Boston neighborhoods with highest volume of de-stressing activities reported on Twitter

1. Downtown
2. Fenway
3. Back Bay
4. South Boston Waterfront
5. Beacon Hill

Location of airport causes high Tweet activity in East Boston

Allston

Back Bay

West Roxbury

**De-stressing Tweet Volume**
- Low
- Moderate
- High

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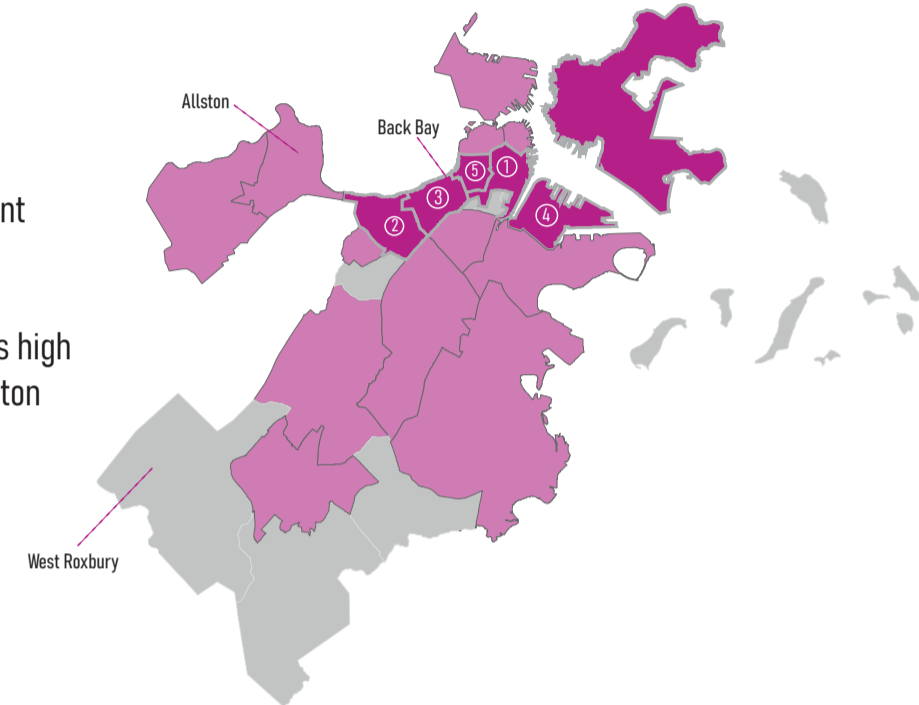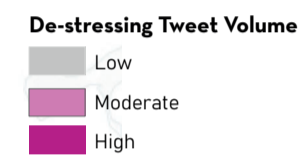
## Using Linguistic Tools to Identify STRESS Level & Activity

We used Deep Neural Network CNN 1D convolutions for stress classification, implemented using Pytorch library in Python.

All Tweets → #Hashtag for Stress & De-stress → YES → Feature Construction → Training Set → CNN Classifier → Classified Tweets Stress & De-stress → Topic model & Cluster

Bag of words, n-gram, LIWC score and Tensi- strength

NO

All Tweet Pool ← Validation Set

| | Accuracy | Precision | F1-score |
|---|---|---|---|
| De-stress | 0.93 | 0.94 | 0.94 |
| Stress | 0.95 | 0.98 | 0.96 |

Study shows 4636 of unique Twitter users in Boston, with more than 10,000 de-stressing activity reported over a period of 6 months. 280 frequent users are found with average Tweeting frequency of 1-per month.

Latent Dirichlet Allocation is used for topic modelling and subsequently K-means clustering is used to identify 5 clusters of the Tweets.
**City and Public Amenities** - People describes how happy they are with the public amenities (park, trail, plaza, restaurants, museums) in the city.
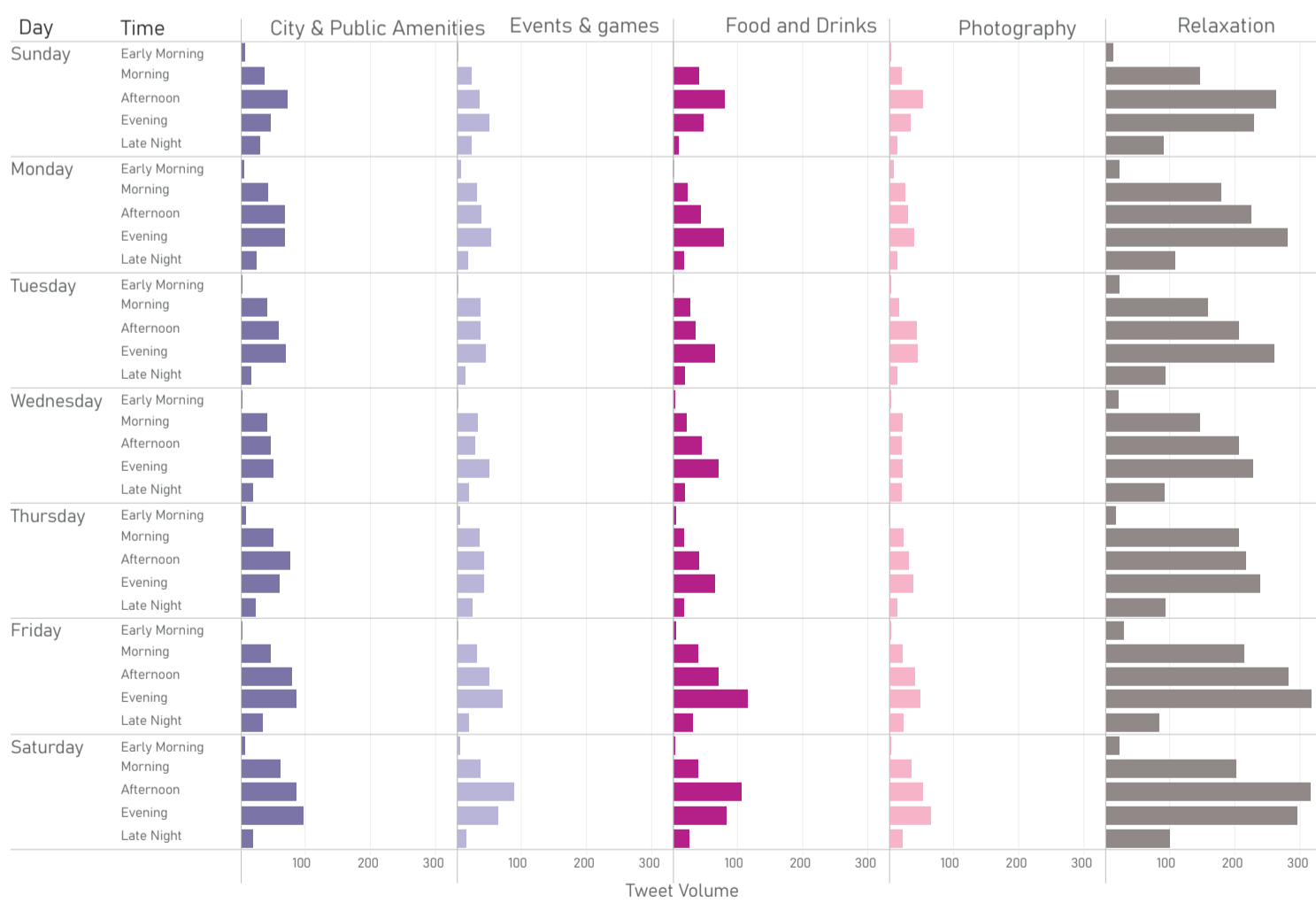**Games and Events** - People reported visiting weekend events, games, etc. for fun
**Food and Drinks** - People enjoyed drinking beer , wine or eating food on certain occasions.
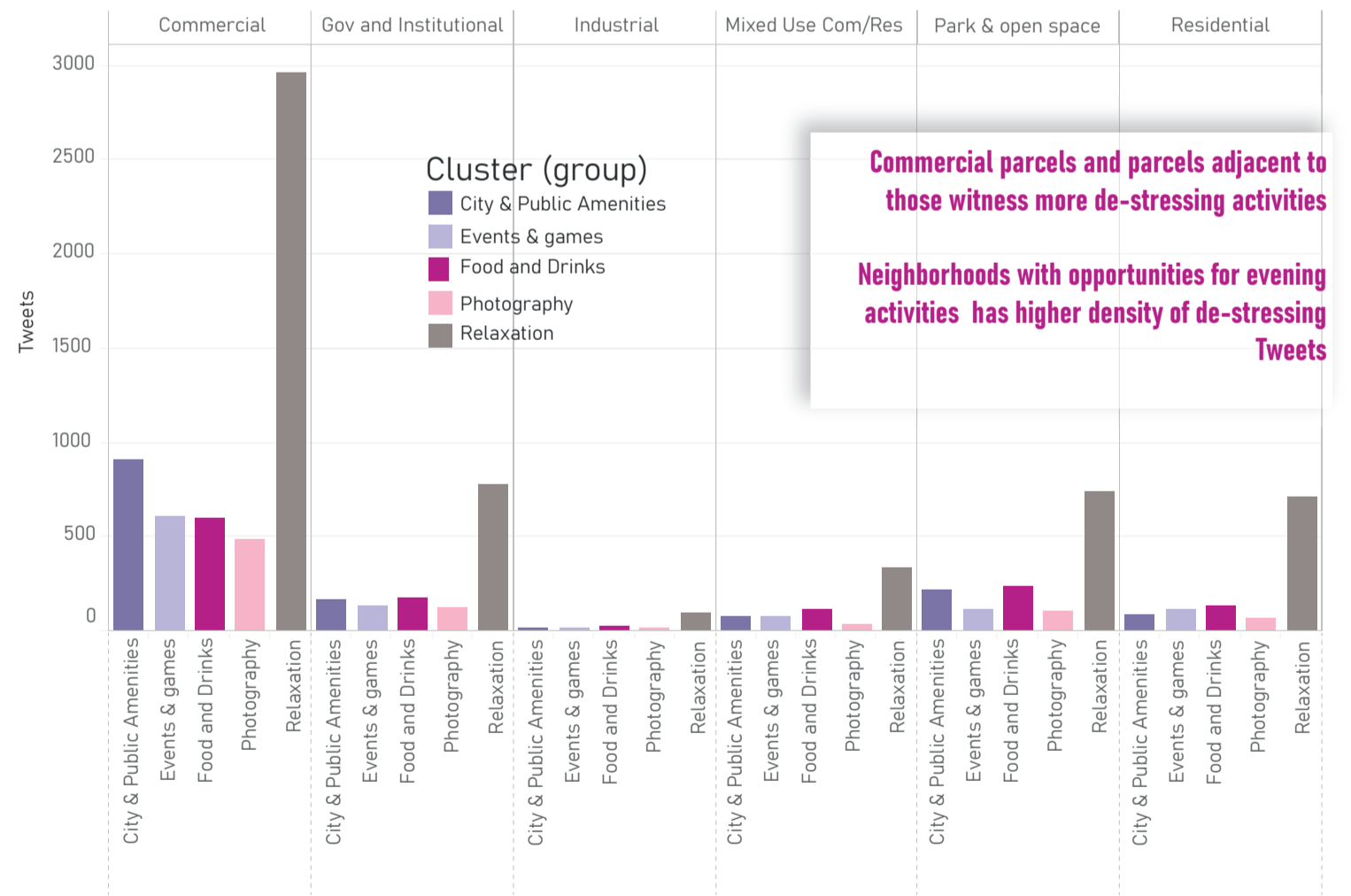**Photography**- People reported taking pictures or videos, and shared their instagram posts.
**Relaxation** - People did various activities like yoga, strolling , taking a walk or even engaging in activities like gardening watching, television, cooking.
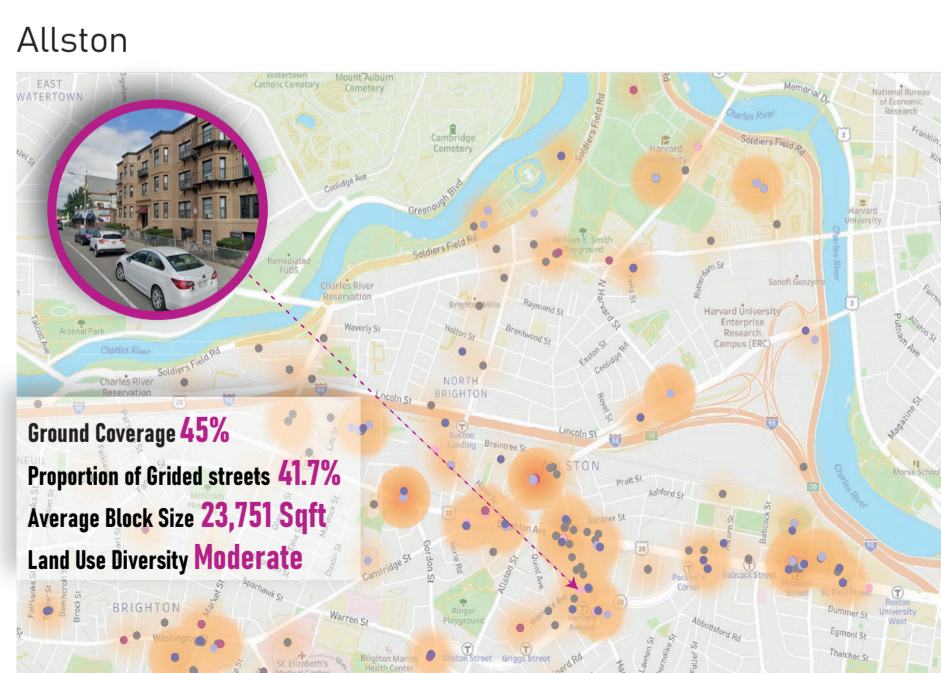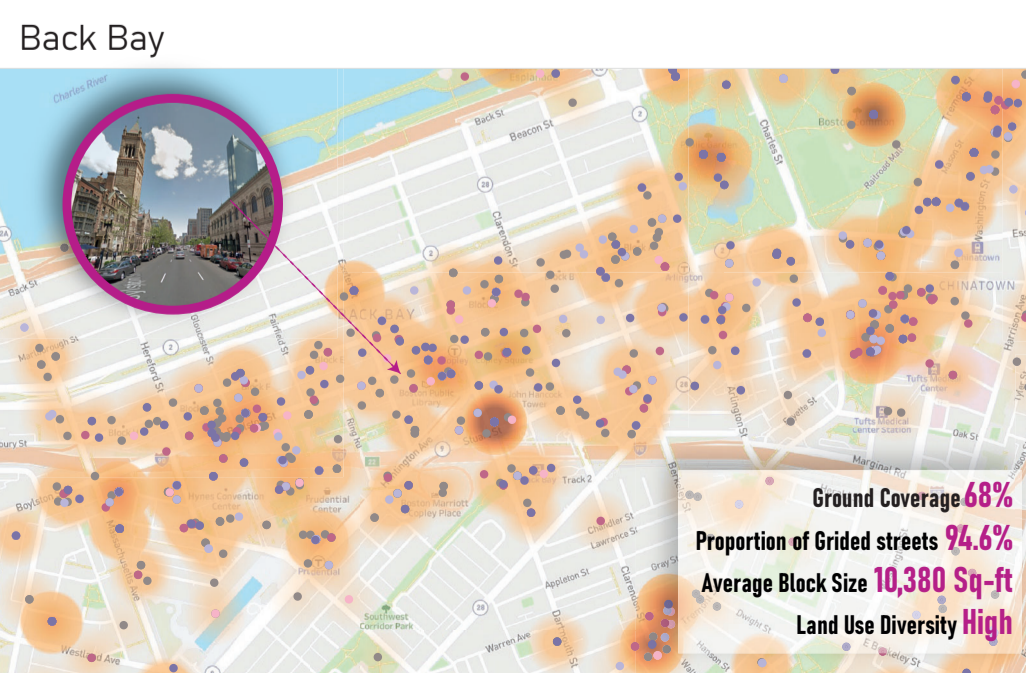
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## Activity Clusters by Time of the Day and Week



Columns: City & Public Amenities | Events & games | Food and Drinks | Photography | Relaxation

Days: Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday
Times: Early Morning, Morning, Afternoon, Evening, Late Night

Tweet Volume: 100 200 300

## Land Use and Activity Clusters



Categories: Commercial | Gov and Institutional | Industrial | Mixed Use Com/Res | Park & open space | Residential

Cluster (group)
- City & Public Amenities
- Events & games
- Food and Drinks
- Photography
- Relaxation

**Commercial parcels and parcels adjacent to those witness more de-stressing activities**

**Neighborhoods with opportunities for evening activities has higher density of de-stressing Tweets**

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## Maps Showing Areas of High, Moderate, and Low level of De-stressing Activities

### Back Bay



Ground Coverage **68%**
Proportion of Grided streets **94.6%**
Average Block Size **10,380 Sq-ft**
Land Use Diversity **High**

### Allston



Ground Coverage **45%**
Proportion of Grided streets **41.7%**
Average Block Size **23,751 Sqft**
Land Use Diversity **Moderate**

## Heat map for De-stressing Activities showing Activity clusters

### West Roxbury



Ground Coverage **21%**
Proportion of Grided streets **27.3%**
Average Block Size **40,743 Sqft**
Land Use Diversity **Low**

Low Density — High Density