Using Augmented Reality to Quantify Art Density:

a case study using Pokémon GO & Ingress

Augmented Reality (AR) games superimpose computer-generated images on a user's view of the real world, providing an immersive reality including virtual objects. Niantic, Inc., has been at the forefront of AR, with games such as *Field Trip* (launched 2012), *Ingress* (launched 2013), and *Pokemon Go* (launched 2016), all of which are location-based AR mobile apps.

Both *Ingress* and *Pokemon Go* require players to travel to existing landmarks (like monuments, buildings, or artworks) to play. These locations are known as *portals* in *Ingress*, and *pokestops* and *gyms* in *Pokemon Go*. Niantic, Inc. was initially part of Google[1], which provided the founding database of geo-tagged images and historical monuments used in both apps. This list was augmented by user submissions, leading to the **vast database of artistic, cultural, historic, and artistic artifacts** which provides the backdrop for both apps.

Why mine AR data?

- **Vast data volume and variety**
  - Great for urban exploration, tourist- and resident-friendly
  - Difficult to find minor and embedded art, history, and culture through other sources (ex: Atlas Obscura)
- **Young user base (~46% 18-29 years old[2])**
  - More likely to travel locally and utilize AR
- **Accomodates changes based on user submissions**
  - Ex: Pokestop locations can be removed/changed based on sponsorships, or if a sculpture moves
- **Intrinsic value in location**
  Geotagged pokestops or gyms or portals indicate that players see value in a site/monument/artwork, and have suggested other players to visit this site
- **Real location linked to in-game incentive**
  Ex: visit pokestop to get pokecoins, potions, special items
  Ex: visit portal to get XP/AP, weapons, items

Goal

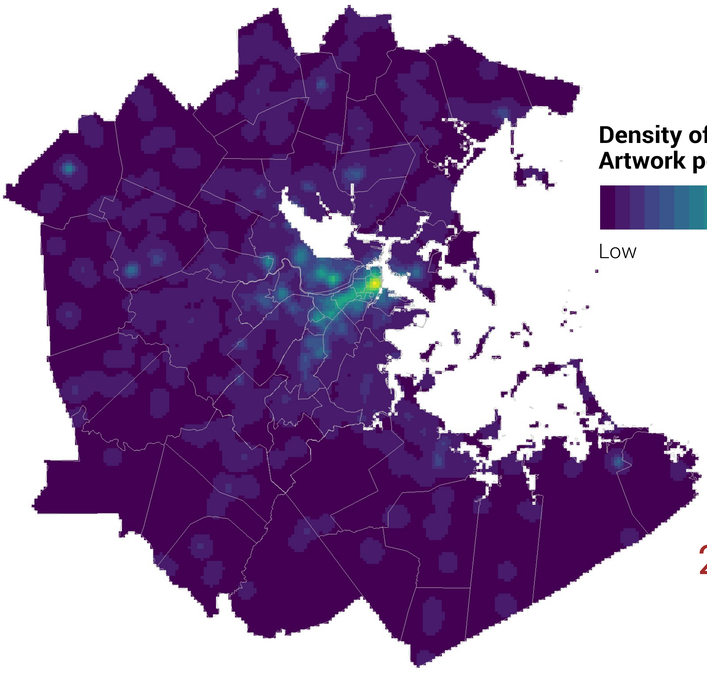
Use Pokemon Go and Ingress data to quantify density of artistic works in Metro Boston area

Methods

1. Defined towns and neighborhoods of Greater Boston using shapefiles from City of Boston.
2. Scraped locations of portals, pokestops and gyms for Greater Boston from Ingress Intel Map using Ingress Intel Total Conversion, Tampermonkey, and JS plugins from Gary Daigle (@Zetaphor), Terrance Ollie (@OllieTerrance), and Travis Odom (@Travis.A.Odom).
3. Developed automatic classification method to classify scraped locations into History, Art, Buildings, Greenspaces, Recreation, Religious, Transport, and Water.
4. Manually classified remaining locations by searching locations and coordinates on outgress.com/portals, pokemongomap.info, and Google Maps.
5. Subset Artwork category, and reclassify subcategories.

Keywords	Category
Façade, Facade, Door, Pillar, Column, Wall	Architecture
Stained Glass, Glass	Glass
Painting	Painting
Giant, Lion, Granite, Bronze, Bust, Sundial	Installation
Statue	Statue
Minutemen, Minute Man, Minute Men, Minuteman	Statue, Minuteman
Saint, Cross, Crucifix, Jesus, Mother, Mary	Statue, Religious
Angel	Statue, Funerary
Mosaic	Mosaic
Graffiti, Mural, Street Art	Mural
Terracotta, Ceramic, Urn	Ceramics
Box, Switchbox, Box Mural, Signal Box, Electrical Box	Electrial Box
Structure, Sculpture	Sculpture
Fountain	Fountain
Relief, Bas Relief, Motif, Frieze	Relief
Engraving	Engraving
Store	Storefront
Sign	Sign

Results



+12,000 portals scraped

2,100 portals manually reclassified

2,362 art-related points

Town	Statue	Mural	Sculpture	Architecture	Electrical Box	Sum
Cambridge	47	68	48	25	13	188
Jamaica plain	14	49	14	7	12	84
Downtown	15	13	14	36	7	78
Back bay	24	8	22	14	2	68
Roxbury	7	41	3	6	8	57
Watertown	25	9	9	12		55
Quincy	28	10	10	6	1	54
Fenway	12	17	15	9	2	53
Waltham	24	9	13	3	7	49
Dorchester	19	21	4	1	6	45
Allston	8	29	4	3	11	44
Brookline	14	13	4	13	3	44

Data Sources: *Towns polygon* from City of Boston; *Boston Neighborhoods* shapefile from Open Data Boston; Pokemon Go gyms, pokestops, and Ingress portal data scraped from the Ingress Intel Map, and verified with Outgress, PokemonGoMap.Info, and Google Maps.

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