

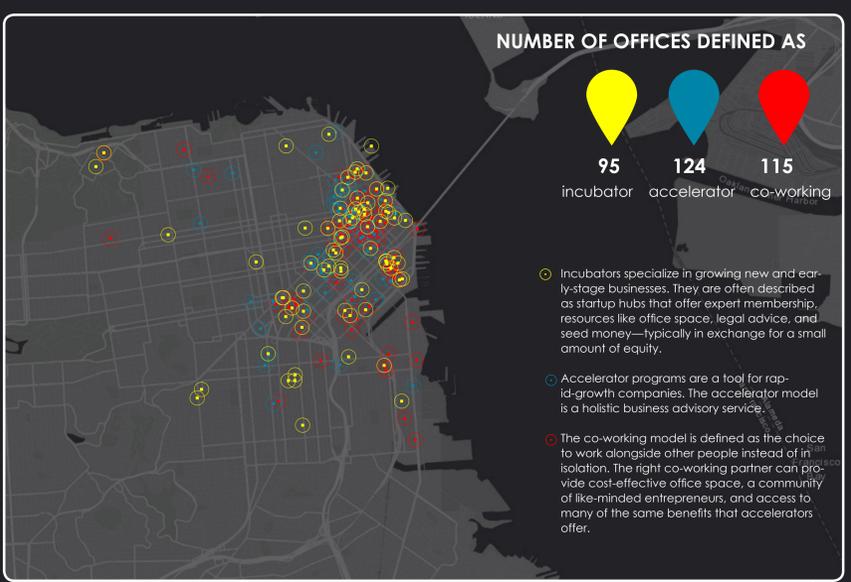
HOW INNOVATION AFFECTS INNOVATION: INCUBATORS, ACCELERATORS & CO-WORKING SPACES' SPATIAL DISTRIBUTION in SAN FRANCISCO



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1. HOW DO INCUBATORS, ACCELERATORS & CO-WORKING SPACES CLUSTER IN SAN FRANCISCO?



Within the context of the late 2000s, a wide diffusion of innovation hubs emerges. San Francisco, as the home to the first co-working space, "Hat Factory", is now home to a variety of startups, freelancers, angel investors, all interested in finding their match. Under the hypothesis that sharing the same space might foster an innovative and collaborative community to the creative class, incubators, accelerators and co-working spaces are seen as information exchange and business opportunities.

This research attempts to investigate the geography of entrepreneurship activities and identify the high priority urban spaces for entrepreneurs in San Francisco. We will approach this research by looking at the spatial pattern of these three types of innovation space: co-working, incubator, accelerator and figure out the key factor influence the developers to make the choices of the locations.

The significant applications of this research lie both for the venture capital firms and developers who run these spaces and the entrepreneurs who are looking for places to work in. On the one hand, based on the data and analysis we have, we can run a simulation to find the prospective places for future innovation hubs; on the other hand, our model could help the entrepreneurs to find a better place to stay.

However, restricted by the data and the limited time, the research may have several limitations:

- Only seven factors have been taken into consideration. Other factors like the pattern of existing companies or hubs, the relationship with public space are not tested.
- This research is conducted inside a city scale. More patterns across the cities may be studied in the future.
- The scale of the sample is not big enough to model a water-tight simulation. If more data can be generated in the future, researchers can apply machine learning for a more accurate simulation.

Figure 1. Location of incubators, accelerators and co-working spaces in San Francisco are geocoded and mapped.

2. WHAT ARE CORRELATIONS BETWEEN INNOVATION HUBS DISTRIBUTION AND ...?

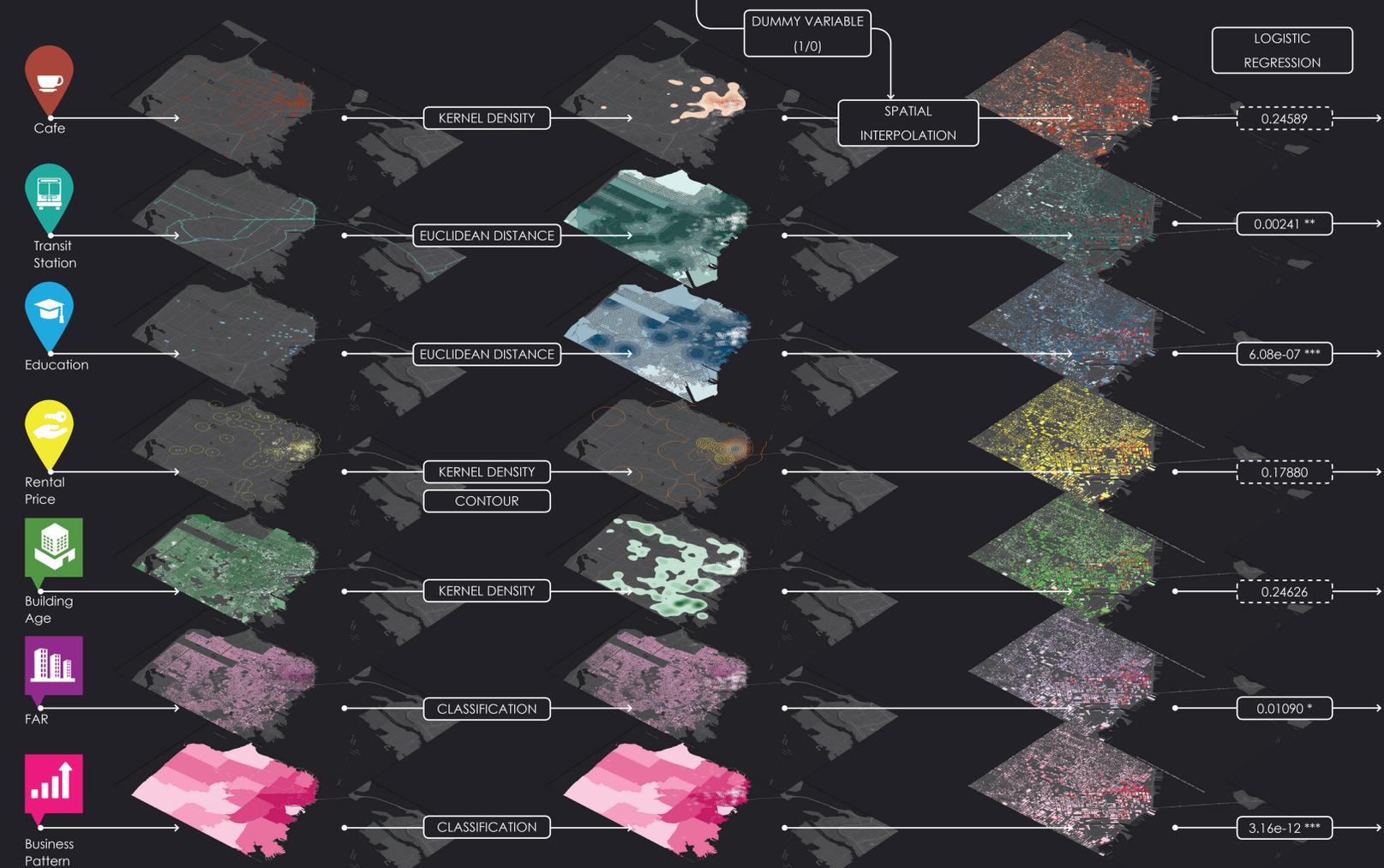


Figure 2. Analysis methods: 1) Cafe, Transit Station, Education, Rental Prices, Building Age, FAR and Business Pattern are geocoded and mapped; 2) Through geospatial analysis, spatial interpolation, and logistic regression, a prediction model was generated to examine the spatial potential of innovation hubs in San Francisco.

3. WHAT DO INNOVATION HUBS LOOK LIKE?



Figure 3. Amenities mapping at 180 Sansome St



Figure 4. Amenities mapping at 1885 Mission St

Data Resource:

Incubator	https://www.crunchbase.com/search/principals/206050c140a1c0c92edf524de7187ca9a748b https://www.bizjournals.com/sanfrancisco/subscribe-only/2018/02/09/bay-area-incubators-and-accelerators.html https://sanfrancisco.cbslocal.com/2017/08/15/san-francisco-incubators/
Accelerator	https://www.inc.com/john-campbell/top-10-hot-incubators-to-join-in-silicon-valley.html https://www.crunchbase.com/search/principals/17d167907d02c8802e0d7d6facd783845db501 https://www.france-science.org/incubators-and-spaces-in-the-san.html
Co-working Space	https://www.crunchbase.com/search/principals/64b942ed616a20279ce9c8a0ca006224a500acc https://www.coworker.com/united-states/california/san-francisco https://www.gelkai.com/blog/top-40-coworking-spaces-san-francisco-bay-area
Education Density	Colleges in San Francisco (2011). Last updated in July 17th, 2016. Retrieved via: https://data.sfgov.org/Economy-and-Community/Colleges-in-San-Francisco-2011-/83f-pc6a
Transportation	Rail Line USA 2011. Data source: United States, Federal Transit Administration. Retrieved via: Harvard Geospatial Library. Rail Transit Stations: United States and Territories, 2013. Data source: United States, Bureau of Transportation Statistics. Bus Stops 2008. Data source: Bus Stops, San Francisco Bay Area, 2008. Retrieved via: https://geo.nyu.edu/catalog/stanford-jb056dp5726 Parking Lot. Data source: TIGER/Line Shapefile, 2012, county, San Francisco County, CA. All Roads County-based Shapefile. Retrieved via: https://catalog.data.gov/dataset/tigerline-shapefile-2012-county-san-francisco-county-ca-all-roads-county-based-shape-file https://www.loopnet.com/sitemap
Office Rental Price	U.S. Census Block Group: ESRI Data Maps 2010. Originator: Tele Atlas North America, Inc. Retrieved via: Harvard Geospatial Library.
Population Density	referenceUSA
Floor area ratio	Building Footprints (File Geodatabase Format), 2010. Retrieved via: https://data.sfgov.org/Housing-and-Buildings/Building-Footprints-File-Geodatabase-Format-/asx6-3lrm

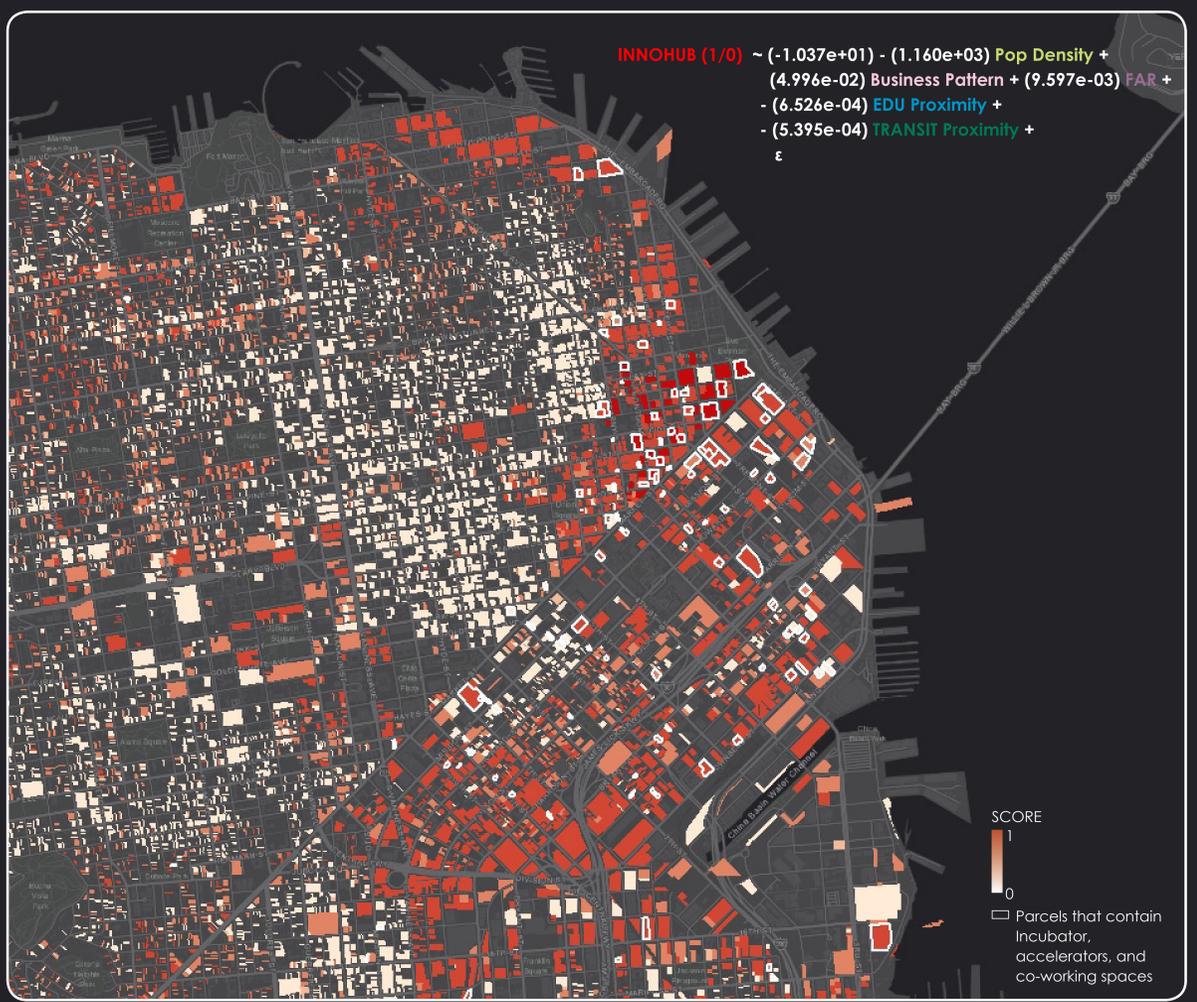


Figure 5. Score Map: with logistic regression model, we assigned scores to the city parcel. The score shows the probability that a parcel could provide environment for innovation hubs. We overlay the actual parcels that have innovation hubs with the prediction map.