AB. — THE UNIVERSITY OF TOKYO

まちづくりDXの事例紹介:都市にデータを用いるセンス

Case studies for the community design DX: the aesthetics for using bigdata for cities

研究者目線で見たまちづくりDX

まちづくりにデータをどのように使うか?

ここがまちづくりDXの肝(e.g.,今までもまちづくりにデータは使われてきた)

取得できるデータの量や質、データの取得の仕方が変わってきた

→ データの使い方が変わってきた。

e.g.,:

データの量が変わったのに、今までと同じ分析の仕方(e.g., エクセル)を想定も問題アリ Pythonへ

データの質が変わったのに、今までと同じデータの使い方を想定も

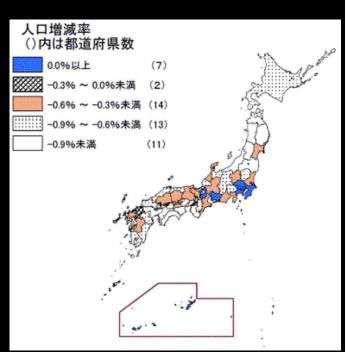
問題アリ ゲームチェンジへ
Urban \_\_\_\_\_ Sciences \_\_\_\_\_

### 今日のポイント:

- 量的な変化は質的な変化をもたらす(Mayer-Schonberger and Cukier, 2013)
- まちづくりのゲームチェンジをしているからこそ「<mark>古典</mark>」が大事
- まちづくりDXにおけるデータ活用にはセンスが必要

Urban LAB. Sciences

### 衛星画像(夜間光)を用いた縮小都市(Shrinking Cities)の定量評価手法の提案



出典:総務省統計局ホームページ

https://www.stat.go.jp/data/jinsui/2019np/index.html



Contents lists available at ScienceDirect

Cities

journal homepage: www.elsevier.com/locate/cities



Determining the association of the built environment and socioeconomic attributes with urban shrinking in Yokohama City

Shuang Ma <sup>a</sup>, Yusuke Kumakoshi <sup>a</sup>, Hideki Koizumi <sup>a,b,\*</sup>, Yuji Yoshimura <sup>a,\*\*</sup>

Research Center for Advanced Science and Technology, The University of Tokyo, Tokyo 153-8904, Japan

Department of Urban Engineering, The University of Tokyo, Tokyo 113-8656, Japan

VIIRS night-time light Shrinking city Built environment attributes ocioeconomic attributes Mixed GWR

Urban shrinking means a densely populated urban area or city where is experiencing a significant population loss. Currently studies have examined the relationship between built environment and socioeconomic attributes and urban shrinking, however ignore the local effects. Here, we show spatially heterogeneous associations of environment and socioeconomic attributes with urban shrinking reflected by the change of VIIRS night-time light radiance during the period 2014-2019 by mixed geographically weighted regression model, after variables screening by random forest.

We found that during the period 2014-2019, there were 35 km2 in Yokohama was shrinking, with most them being mixed-use land. In general, bus stop density (BSD), road intersection density (RID), aging population (PoAP), housing price (HP), distance to the nearest park (DNP), proportion of business areas (PoBA), and proportion of private houses and flats (PoH\_ private) have mixed effects on urban shrinking. Furthermore, BSD, RID, PoAP, DNP and PoH\_private have negative or positive association with urban shrinking across locations, suggesting spatial heterogeneous strategies should be considered to address urban shrinking. We anticipate our study to be a start point to use mixed GWR model in shrinking city and as additions in examining the relationship between built environment and socioeconomic attributes and population loss.

#### 出典: NASA

衛星からの夜間光を時系列に比較分析:光があるところ=人がいるところ

### Before DX(いままで):

- 国勢調査などを利用
- データが数年毎になってしまう
- 短期サイクルでの評価が難しい

### After DX(これから):

- 衛星データの利活用
- 中長期的な評価でなく、短期的なサイクルでの評価ができる

Urban — Sciences

### Google Street ViewやMapillaryなどの風景画像と機械学習を用いた都市整備評価の提案















Springer Link

Artificial Intelligence, Machine Learning, and Optimization Tools for Smart Cities pp 123–13

#### A Pedestrian-Level Strategy to Minimize Outdoor Sunlight Exposure

Xiaojiang Li, Yuji Yoshimura, Wei Tu & Carlo Ratti

Chapter | First Online: 09 January 2022

266 Accesses | 1 Altmetric

Part of the Springer Optimization and Its Applications book series (SOIA, volume 186)

#### Abstract

Too much sunlight exposure would cause heat stress for people during the hot summer, although a minimum amount of sunlight is required for humans. Unprotected exposure to ultraviolet (UV) radiation in the sunlight is one of the major risk factors for skin cancer. Mitigating the heat stress and UV exposure caused by too much sunlight exposure becomes a pressing issue in the context of increasing temperature in urban areas. In this study, we

### Before DX(いままで)

- 上空からの評価(航空写真、緑被率)
- 地上を歩いている人間の感覚との相違

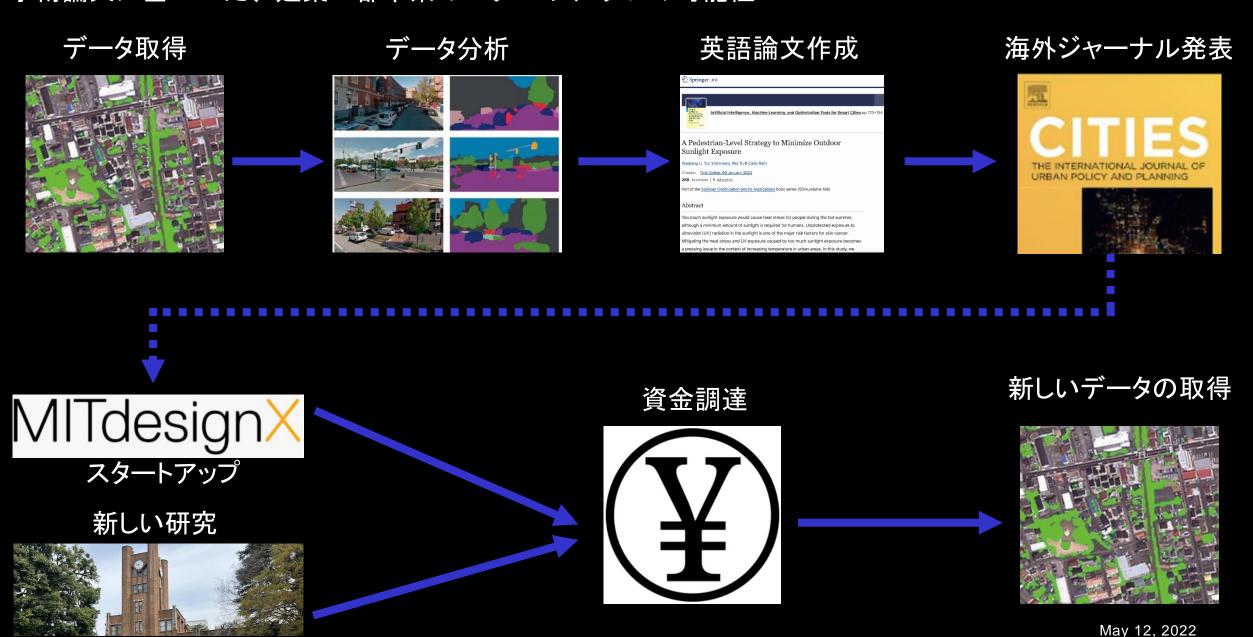
### After DX (これから):

- ヒトの感じ方からの評価 (e.g., 人の目線)
- 短期的なサイクルでの評価(e.g.,リアルタイムすら対応可能)

Urban LAB. Sciences

May 12, 2022

### まちづくりDXの新しい役割: 学術論文に基づいた、建築・都市系のスタートアップの可能性



### <u>ゲームチェンジの今だからこそ古典が大事</u>:

### デジタルテクノロジーで近代の都市理論を全て読み替えるシリーズ



記憶の定量化

都市イメージ のビッグデー



This paper discusses the relationship between the spatial structure of the built environn and people's memory of the city as derived from their perceptual knowledge. We explore spatial comprehension is influenced by the spatial layout pattern in urban settings and individuals' daily activities. In doing so, we seek to determine whether better spatial knowledge is a function of the legibility of the city and of temporal factors, particularly t amount of time spent in a place. For this purpose, we created a web-based visual survey form of a geo-guessing game. The participants were asked to guess the locations of randstreet views within a familiar neighborhood by placing a pin on a map. This system enab to measure how well they remember different urban images on the basis of two indicato



- 消費行動のビッグ データ解析
- 都市構造のネット ワーク分析



- 生物多様性指 数の適応
- 小売店・飲食 店との相関



whether greater diversity actually contributes economic benefits to a ne Focusing on the number and types of stores at the street level, we use Weaver index to quantify commercial diversity. We then compare the o diversity with store sales volumes obtained through credit card transact in the neighborhood divided into a 200-m grid. The results of the analyst Spanish cities, show that the greater the diversity in the grid, the higher of the stores, and this tendency is more evident in large than in small-r addition, we found that the coexistence of different store types provides environment for the emergence of hub stores. We specifically define a paper as the store with the largest revenue within a grid, provided that sales revenue in a grid is statistically similar to the power law. We spec trigger exploration between different store types, and consequently, the highly diverse neighborhoods increase compared with those of less div

Spatial clustering: Influence of urban street networks on retail sales /uii Yoshimura D. Paolo Santi, Juan Murillo Arias. . . . more... Show all a First Published September 10, 2020 Research Article (6) Check for updates https://doi.org/10.1177/2399808320954210 Article information ~ Abstract

As is often believed that the more centrally located a shop, the higher its sales volum paper analyzed relationships between the spatial clustering of retail stores, their respi transaction volumes, and the urban street networks to determine whether, and to what extent, the accessibility and density of a store's location was correlated with its transa volume. While this hypothesis is widely accepted, its veracity is underexplored and ra validated using large-scale empirical datasets, possibly owing to the lack of access Therefore, transaction datasets and accessibility indicators were first examined: a cle positive correlation between density and revenue was found for specialty stores when people do "comparison shopping," and for stores that complemented each other for activities such as "one-trip shopping," the revenues were positively correlated when stores were clustered. Generally, daily-use stores' revenues were more sensitive to l access and those of non-daily-use stores were more sensitive to global access. In conclusion, these findings would not have been found using conventional methodological focused on the retail sector as a whole, because aggregate market mechanisms wou

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ビッグデータをまちづくりにどのように活用するかの実例の紹介

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**~ 研究について ~ 連携活動について ~ 教育について ~ 先端研について** 

ホーム / ニュース / プレスリリース / 街路の歩行者空間化は小売店・飲食店の売り上げを上げるのか、下げるのか?~ビッグデータを用いた経済効果の検証~

## 街路の歩行者空間化は小売店・飲食店の売り上げを上げるのか、下 げるのか?~ビッグデータを用いた経済効果の検証~

プレスリリース

2021年10月29日

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小泉 秀樹(東京大学先端科学技術研究センター 共創まちづくり分野 教授)

## 我々の社会は「歩いて楽しいまちづくり(歩行者空間化)」へ向かっている



Pedestrian – centered urban planning (urbanism)



どうして「歩行者空間にするのですか?」「歩いて楽しい街を作るのですか?」

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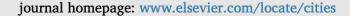
歩行者空間化の効果はどうだったのか?生活の質は上がったのか? 住民は幸せになったのか?

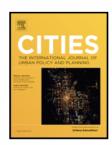
Urban \_\_\_\_\_ Sciences



Contents lists available at ScienceDirect

#### Cities





# Street pedestrianization in urban districts: Economic impacts in Spanish cities

Yuji Yoshimura<sup>a,\*</sup>, Yusuke Kumakoshi<sup>a</sup>, Yichun Fan<sup>b</sup>, Sebastiano Milardo<sup>c</sup>, Hideki Koizumi<sup>a</sup>, Paolo Santi<sup>c,d</sup>, Juan Murillo Arias<sup>e</sup>, Siqi Zheng<sup>b</sup>, Carlo Ratti<sup>c</sup>

#### ARTICLE INFO

Keywords:
Pedestrianization
Urban morphology
Street network
Transaction data
Consumer city

#### ABSTRACT

This study analyzes the influence of pedestrianization of urban space on the revenues of surrounding retail stores. Pedestrianization refers to the conversion of street use from vehicles to a walkable environment. We compiled a unique transaction dataset containing the estimates of sales volumes for stores across Spain and combine it with data from Open Street Map to provide the history of land-use changes at the street-level. Based on these high-granular datasets, we apply a difference-in-differences empirical method to measure the economic impact of pedestrian intervention. The results show that stores located in pedestrian environments tend to record higher sales volumes than stores located in non-pedestrian environments. We further analyze the mechanisms underlying this revenue-boosting effect and find that a key factor is the store density of the pedestrianized place, while geographic location is insignificant. This finding suggests that there are no differentiation impacts on stores' rev-

<sup>&</sup>lt;sup>a</sup> Research Center for Advanced Science and Technology, the University of Tokyo, 4-6-1 Komaba, Meguro-ku, Tokyo 153-8904, Japan

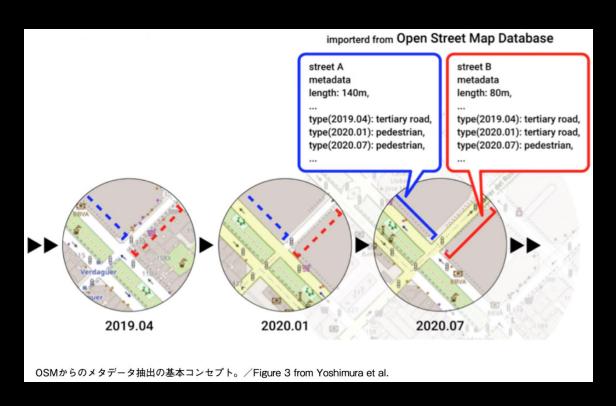
<sup>&</sup>lt;sup>b</sup> Department of Urban Studies and Planning, Center for Real Estate and Sustainable Urbanization Lab, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, MA 02139, USA

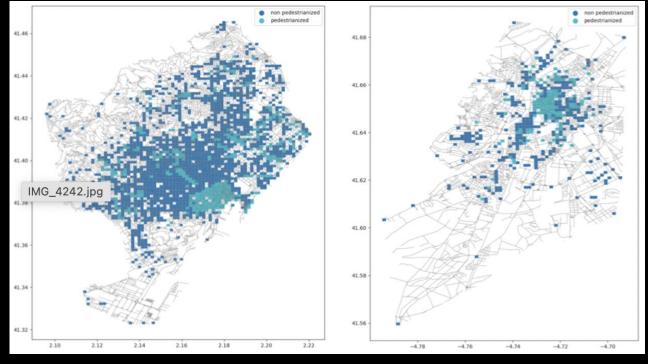
<sup>&</sup>lt;sup>c</sup> SENSEable City Laboratory, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, MA 02139, USA

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e BBVA (Data Strategy area), c/Sauceda 28, Madrid 28050, Spain

## OSMからの属性データの抽出技術とマッピング技術の開発





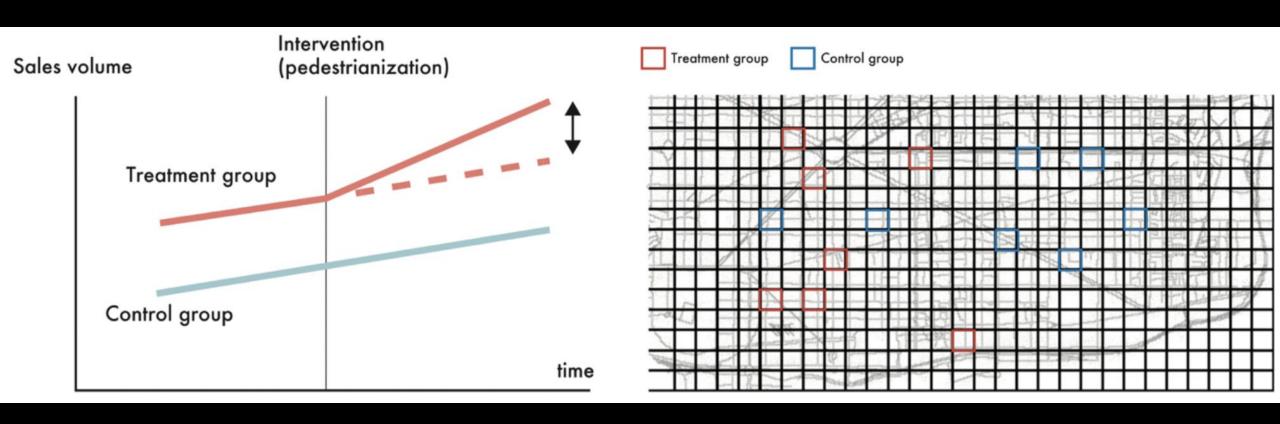
### 属性情報:

道路幅、道路長、いつ用途変更されたか?いつ歩行者空間になったか?

### 学(アカデミック)の役割:

市民が作ってくれたオープンデータから 如何に公益性の高く有益な情報を創り出すか

## DID(差分の差分)の適応:計量経済学



結果

歩行者空間化すると、そこに立地する小売店・飲食店の売り上げは向上

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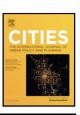
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#### $A\;B\;S\;T\;R\;A\;C\;T$

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歩行者空間化によって、そこに立地 しているお店の経済的な側面は分析 できた

歩行者空間化によって、そこに住ん でいる人々は幸せになったのか?



## 個と場の共創的Well-Being Symposium

JST未来社会創造事業 採択課題「個人の最適化を支える「場の状態」:個と場の共創的Well-beingへ」キックオフイベント

JST事業領域ウェブサイト https://www.jst.go.jp/mirai/jp/program/society4diversity/index.html

開催概要 1

Urban-

## 新建築住宅設計競技2022

SHINKENCHIKU RESIDENTIAL DESIGN COMPETITION 2022

主催 一般財団法人吉岡文庫育英会 株式会社新建築社

<sup>課題 |</sup>ビッグデータと都市ーウェルビーイングな空間デザインー

# **Big Data and City**

—Spatial design for well-being —

## Yuji Yoshimura 吉村有司



審査員: 吉村有司 受知県生まれ/2001年~遂西/ボンパウ・ ファブラ大学情報適信工学部博士展現修了 /パルセロナ都市生駆学庁、カタルーニャ 先進交通センター、マサチューセッツ工科 大学研究員などを経て2019年~東京大学 先郷科学技術研究センター特任進表現

https://japan-architect.co.jp/skc 🎰 :#######WEBページより

登録開始 2022年6月1日(水) 登録・提出締切 2022年11月1日(火)日本時間18:00

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Sciences

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## ご清聴ありがとうございました! Thank you so much for your attention

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