

# Media, perception and location behaviour: crime reporting and house prices in U.S. cities

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## Abstract

Cities have been seen by their residents not only through their daily life experiences but also by means of a wide range of media resources that create an image in their minds. How this image can shape the behavioural decisions of people regarding cities and the places they live has rarely been studied. Employing new techniques and technologies in Natural Language Processing (NLP), and focusing on the impact of the perception of crime as conveyed by media on the typical housing prices in US cities, this paper tries to investigate if media representations of cities can have a spatial impact at large geographical scales. The paper puts forward novel techniques of application of NLP to urban studies and proposes a pipeline of different NLP techniques to study news corpuses about cities. The results show that the image of cities in the media regarding crime has a significant correlation with typical housing prices in US cities.

## Outline of the Paper

The mechanisms behind the growth and decline of cities have been studied in a broad literature about agglomeration economies, explaining how firms and households relocate and agglomerate according to the equilibrium of attractive and repulsive forces created by urban advantages and disadvantages (Puga, 2010, Rosenthal & Strange, 2004). However, looking from the perspective of people as primary agents of urban dynamics, how they behave and make location decisions is more dependent on the subjective perceptions they have of a place than from rational cost-benefit decisions. Thus, they pursue the aim of maximizing - or optimizing - the satisfaction of a variety of their needs based on their perceptions (Cardoso et. al., 2019).

The reputation of a city based on people's perceptions can influence their attitude towards that city, and therefore their behaviors, including the intention to migrate to or leave a city (Zenker and Gollan, 2010), and intra-city dynamics, e.g. housing relocation (Buonanno et. al., 2013). A large body of literature has studied the relation between human behavior and how a city is perceived according to objective information about urban conditions, the so-called image of the city (Laaksonen et. al., 2006, Gilboa et. al., 2015). Strands of this concept can be found also in the literature about city branding (Zenker and Braun, 2010; Anholt, 2016). The related literature defines a variety of behavioral dimensions that are interrelated with the image of cities, most of which have a close resemblance with aspects of the satisfaction of human needs in cities, as discussed by Cardoso, Sobhani and Meijers (2022): the image of the city – and the answer to whether it can satisfy one's needs – is constructed from gathered information about cost of living (the need for subsistence) (Zenker and Rütter, 2014), fear of crime (the need for protection) (Bottoms and Wiles, 1997), recreational activities (the need for leisure) (Stylidis, 2018), social inclusiveness (the need for participation) (Merrilees et. al, 2014), physical appearance and cultural landscape (the need for identity) (Stylidis, 2016), business creativity (the need for creation), and cultural tolerance (the need for freedom) (Ramkissoon and Nunkoo, 2011).

Not all information is gathered through similar means, though. How people gain knowledge can have an impact on how they perceive cities and possibly how they behave in them. No doubt that personal experience provides the strongest medium of people-place communication, but that is not the only channel, given the fact that people often have an opinion on a city even if they have never been there. Hence, other communication modes such as official data and statistics, word-of-mouth, and, notably, the media play a significant role in creating the image and perception of a city (Kavaratzis & Ashworth, 2005). The range of people we know is limited making that word-

of-mouth covers just a small range of cities, and data and statistics reach us generally through (social) media. This makes (social) media particularly important in shaping perceptions of places. Media is generally considered a trustworthy, easy-to-access, and prevalent way for people to perceive the real world, specifically cities (Avraham, 2000, 2004; Shoemaker & Cohen, 2012).

One would intuitively expect that although media, to some extent, reflects the reality of a city, media attention to many events, incidents, and entities is coincidental. Gerbner (1970:69) states that the mass production of the message in media represents a world that is based on recurrent and coincidental messages rather than reality. Rosling (2018), in his popular book *Factfulness*, indicates how the image of our world has been distorted due to the rise of new media with a tendency of mass reporting of news, mostly with negative orientation. But keeping up with the enormous quantity of information produced daily about any subject, namely cities, is impossible, making it hard to evaluate the reliability of news and create a balanced synthesis of the information available. This leads to greater difficulties in making informed decisions about moving to, or from, cities (Cardoso et al., 2019). The question therefore remains, when we look at the news produced throughout a longer period, what methodologies can be employed to retrieve, analyse and synthesise very large news corpuses to find out whether media representations about cities, are relatively reliable or highly distorted. Another question is to what extent the misperceptions shaped by media can have behavioral consequences which are determinative for socio-economic trends, and potentially the growth/decline of cities?

The aim of this paper is therefore twofold: first, to study how perceptions constructed by the media affect the spatial location behavior of urbanites. Second, to address this question by introducing a series of Natural Language Processing techniques to deal with large news corpuses and test their applicability to urban studies. To fulfil this aim, the paper focuses on a specific indicator, housing price, which represents one of the most important satisfiers of human needs in cities. We look at the image of US cities by looking into crime news published on the internet from 2014 to 2019. We first examine to what extent the image of the cities in terms of crime as presented and produced in media matches the more objective crime figures using actual crime rates. Then, we assess to what extent this gap between news coverage of crime in cities on the one hand and objective statistics on crime on the other has an impact on the location behavior of people, which we assume to be reflected in housing prices on the housing market. To distinguish the impact of real crime from the effects of the probably biased media image we use an econometrics approach that allows to incorporate the complex variety of more traditional factors determining housing prices.

One way to capture the image of the city in media is to generate indexes based on news that are published about different topics with a clear link towards city names, e.g. indicating a crime incident in a city. To measure the media coverage of crime incidents we used the MediaCloud<sup>1</sup> database and crawled all the news published from 2014 to 2019 in national and local online media resources in the US. These news are coming from variety of online resources, and are about very different irrelevant topics. To process the data, extract crime news reporting an incident, link the news to city name, and classify the news based on the different types of incidents they are reporting, we applied a Natural Language Processing pipeline.

To create a proxy for media coverage of crime incidents in U.S. cities, we designed an information retrieval pipeline. The ultimate goal is to capture all the news representing a crime incident, either violent or property crime, in a given city. To extract the required information, there are two main challenges to be solved by our pipeline. First, the focus of all available pre-trained models and pre-annotated datasets about crime news is 'crime' in general. But this research is interested only in filtering out the news talking about an incident. Second, and more importantly, linking the news piece to the city where that incident happened is much harder as in many cases there is a high ambiguity. For instance, sometimes the city name can have multiple meanings or refer to a broader entity like a government or political entity. These issues can be solved by Named Entity Recognition tasks in NLP, but in our case, there are many city names that simultaneously refer to different geographical entities, for example cities in different states (e.g. Portland, Maine and Portland, Oregon) or the same name for a city and a state (e.g. Washington). Furthermore, in crime news there could be co-occurrence of multiple place

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<sup>1</sup> MediaCloud is an open-source platform for tracking a large number of media resources monthly. More information about this database can be found at <https://www.mediacloud.org>

names, for example one of them representing where the news agency is located, or some redundant information about another city that doesn't have a direct link to the incident. Here we employ Targeted Named Entity Linking that tries to link any crime news about an incident to a target city where the incident happened.

The results of this paper can open many relevant questions whether we can study all cultural aspects of life in cities corresponding to different human needs – i.e. including aspect which are usually not captured by numbers and rankings –by looking at, sometimes distorted, representations in the media. And more importantly, with the rapid trends of integrating a variety of new social media, new technologies, and the dominance of information waves in people's daily life, how these representations and the decisions that people make based on them can impact the development of the cities.