

endogeneity issues, our econometric model is able to quantify the economic and social value of the extracted features on local demand from a causal perspective.

On a broader note, the objective of this paper is to illustrate how multiple and diverse sources of publicly available crowdsourced data can be mined and incorporated into the prediction of local demand to enhance the understanding of users' economic behavior through its interactions with local businesses. Our study demonstrates the potential of how we can best make use of the large volumes of user-generated content and geotagged social media data to create matrices that capture multidimensional characteristics in a manner that is fast, cheap, accurate, and meaningful. Local businesses can use this information to proactively design their business strategies (e.g., advertising and promotions) when facing a potential change of its neighborhood city services. Furthermore, it can help government decision makers to understand local economic trends. For example, it is useful for urban planners to be able to quantify the opportunity cost, and moreover, the overall expected economic outcome of an urban project or event in a location, under various urban and economic conditions. Since our data come from publicly available channels, we can easily apply our methodology to other categories of local businesses in various locations. Such analyses can help small businesses gain insights into their local urban systems and economies, which, in turn, increases their success and the sustainability of urban neighborhoods.

Our research also has implications for location-based services, such as Google Maps, by making it possible to incorporate data into understanding local neighborhoods. Specifically, they can use the model we propose to specify the location efficiency scores in predicting the economic potential for a new market. For example, one possibility would be to provide an "economic index" of each neighborhood for new businesses to predict their demand in different locations and, thus, optimize their location selection.

Our work has several limitations, some of which can serve as fruitful areas for future research. Our analysis is based on a randomly selected subset of Twitter and Foursquare data. It can be improved by leveraging more data from other crowdsourced channels to gain a more comprehensive understanding of traffic and human mobility conditions. Also, in order to better predict the local demand, future work can look into not only the geographic and socioeconomic perspectives of cities, but also other natural and environmental aspects, such as climate and pollution factors, healthcare, etc. Such research would help us draw a comprehensive picture of the overall urban system and to study the economic dynamics and social interactions more precisely.

7. REFERENCES

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