

Census data could be used to improve city neighbourhoods

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A new analysis of the 2011 census has revealed that social differences among city populations significantly influence how neighbourhoods take shape. Researchers hope that their insights could help councils to make



better planning decisions.

Dr. Thilo Gross and Dr. Edmund Barter in the Department of Engineering Mathematics at the University of Bristol, used a new algorithm to gain insight into city <u>neighbourhood</u> characteristics, starting with Bristol.

As reported in the *Proceedings of the Royal Society A*, their study suggests that in order to improve city life, an understanding of where social differences come from and how different neighbourhoods acquire their distinct characteristics is essential.

The two mathematicians analysed the <u>census</u> with an algorithm called "diffusion maps". Rather than focusing on any specific characteristic, they asked which neighbourhoods answer the census questions in a similar way. Thereby they can identify the main underlying properties of neighbourhoods from the entirety of the census, rather than focussing on specific census questions.

Dr. Barter said: "Looking at Bristol to start, we saw that there was a pattern in the data. Our algorithm detected that in very specific areas scattered throughout the city, people answered the census in a similar way, and these areas lined up with former council estates, almost down to the individual building."

However, economic status is only the second strongest signal in the census, areas dominated by students in higher education stand out even more strongly.

Dr. Gross said: "The results from our work are both comforting and alarming: The main dividing lines in the British population are not <u>ethnic</u> <u>origin</u>, but a certain stage of life (being in full time <u>higher education</u>) and, sadly, <u>economic status</u>."



Though data from the British census has been available for some time, the sheer volume of detail it contains has been a major barrier in extracting relevant information, such as properties that determine a neighbourhood's character.

Dr. Barter explained: "As humans we are very good at getting a 'feel' for a place, but to know how to alter it we need to be able to identify and measure where that feeling comes from. The census provides a large amount of information, but it is not particularly user friendly. Our method turns that data into useful information that can be used to improve the lives of residents describing the neighbourhoods of the city."

For the researchers this publication is just the beginning. They plan to extend the study to more cities in the UK, and other countries where census data is available. Eventually they want to understand what makes some cities work better than others, leading to recommendations for improving the lives of the ever-increasing global urban population.

More information: Edmund Barter et al. Manifold cities: social variables of urban areas in the UK, *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences* (2019). DOI: 10.1098/rspa.2018.0615

Provided by University of Bristol

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