

Making Smart Cities Explainable: What XAI Can Learn from the “Ghost Map”

Shubhangi Gupta
shubhangi@gatech.edu

Yanni Loukissas
yanni.loukissas@lmc.gatech.edu

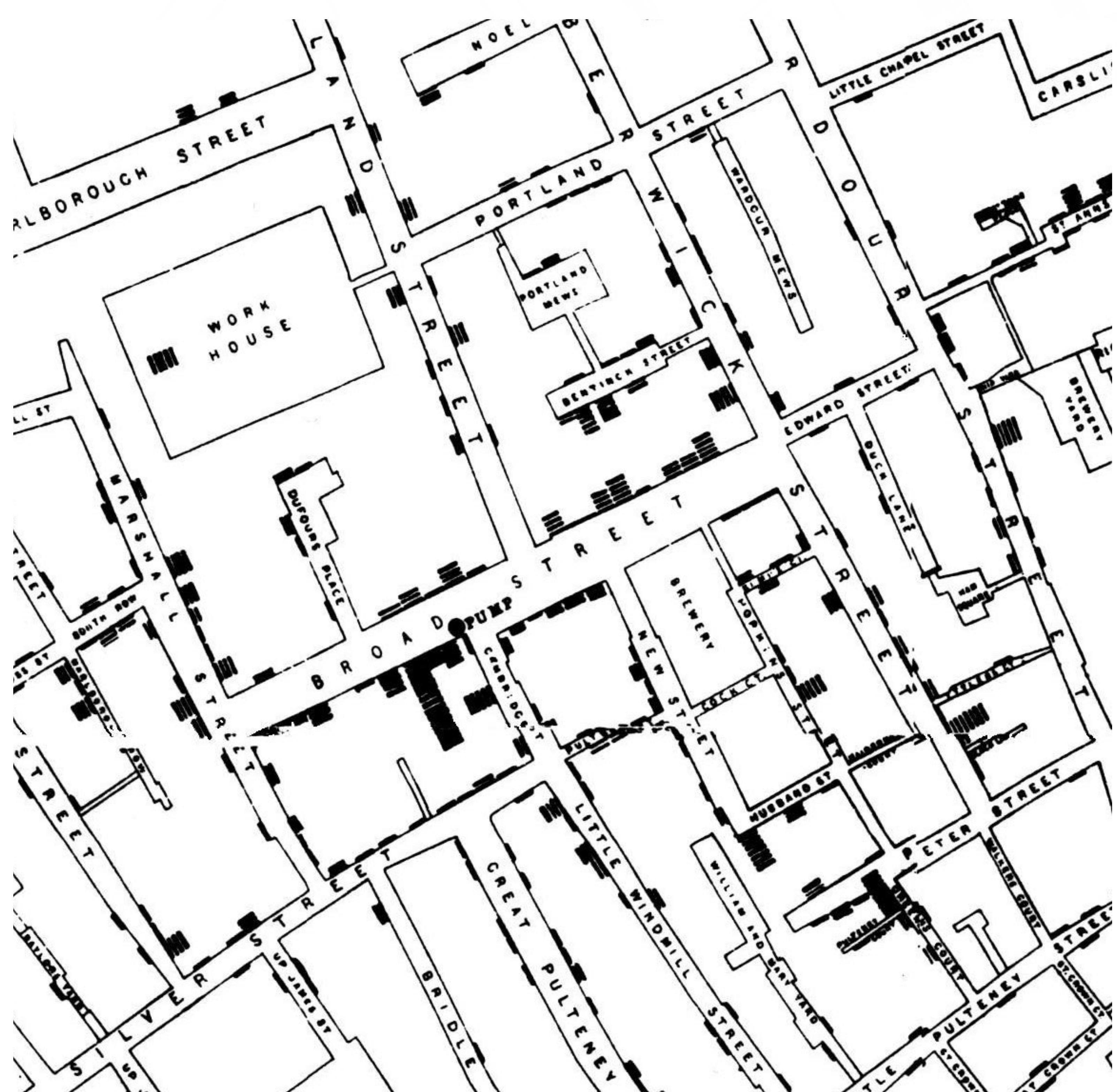
How can the XAI community help explain the spatial impacts of smart city algorithms effectively and ethically for the benefit of city inhabitants?

ABSTRACT

Civic algorithms guide everyday decisions that cumulatively create city life. Yet, their broader effects remain invisible to their creators and city inhabitants. Recent scholarship on “algorithmic harms” presents an urgent need to make smart cities explainable. We argue that existing Explainable AI (XAI) approaches are limited across four important dimensions: accessibility, cultural reflexivity, situatedness, and visibility into internal representations. Our research explores the potential of conventional maps in addressing these limits by harnessing the historical case of the “Ghost Map”. We believe that such examples can help the XAI community learn from the cultural history of city representations, as they seek to establish public processes for explaining and evaluating “smart cities”.

ALGORITHMIC EXPLAINABILITY: LIMITS AND POSSIBILITIES

The limits of existing XAI approaches and the opportunities presented by maps to address those are listed below. While these characteristics are not exhaustive, they are a good starting point to explore if and how maps can serve as useful tools to explain geo-spatial civic algorithms.



John Snow’s map that traces the spread of Cholera deaths during London’s 1854 Cholera epidemic.

Accessibility

XAI methods can be incomprehensible for everyday users. On the other hand, maps are well understood—even treated with affection—by a broad spectrum of audiences.

Cultural reflexivity

XAI methods are not representative of the social and political factors that shape algorithms whereas maps signify their own context of production through their visual languages.

Situatedness

XAI methods are removed from real-world contexts and experiences of city inhabitants. Maps, particularly participatory maps, draw on local knowledges in their making.

Visibility into internal representations

XAI methods focus on the abstract relationship between input and output variables, overlooking their internal representations of cities. Maps reveal how their makers conceptualize cities and the spatial components that comprise them.

In our future work, we will develop a mapping toolkit that communities can use to visualize algorithms that shape smart cities.

