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## Evaluating *Google Trends* as a Tool for Integrating the ‘*Smart Health*’ Concept in the Smart Cities’ Governance in USA

Alexia Sampri<sup>a</sup>, Amaryllis Mavragani<sup>a</sup>, Konstantinos P. Tsagarakis<sup>a,\*</sup>

<sup>a</sup>*Business and Environmental Technology Economics Lab, Department of Environmental Engineering, School of Engineering, Democritus University of Thrace, Xanthi 67100, Greece*

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### Abstract

The aim of this paper is to introduce the methodology of using online search traffic data in order to integrate the public’s online behavior in Smart Health; a concept that is currently rising concerning the health factor of Smart Cities. We use normalized data from Google Trends from January 2013 to December 2015 in the US, aiming at exploring the change in interest in various medical terms, and examine if Google Trends is a possible tool for evaluating health search queries by nowcasting the public’s online interest. The results show that Google Trends’ data can be used for measuring the public’s interest in health related terms, in order to assist with the evaluation of ‘Smart Health’.

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*Keywords:* Big Data; Google Trends; Online Behavior; Smart Cities; Smart Health

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### 1. Introduction

As Smart Cities are becoming all the more popular in science and governance [1] over the last decade, large amounts of data are needed in order to access and evaluate the six pillars of a Smart City, namely ‘Smart Economy’, ‘Smart People’, ‘Smart Environment’, ‘Smart Mobility’, ‘Smart Living’, and ‘Smart Governance’ [2]. Smart Cities are monitored by different kinds of sensors for their evaluation [3], thus allowing the constant gathering of large amount of data [3-4].

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\* Corresponding author. Tel.: +30 2541079397; fax: +30 2541079397.  
E-mail address: [ktsagar@env.duth.gr](mailto:ktsagar@env.duth.gr)

A rising concept is that of Smart Health [5-6], aiming at using mobile health data in Smart Cities [7]. In order for this concept to be integrated in the Smart Cities’ performance, large amount of data, namely Big Data, are needed [5], that could assist with the government’s assessment of the health care system’s issues [7] and in the evaluation of Smart Cities in general and public health in specific [8]. For example, in the US, where these vast amounts of information are analyzed to assist in “clinical analytics” [9].

Big Data have been used in research in the past for the evaluation of the public interest in health issues, as they have been suggested to be valuable in the subject of medicine, and helpful in analyzing patients’ data [10] and in health matters in several topics [11]. Google Trends is a tool that is all the more integrated in scientific research in general and health related issues in specific [11]. To name a few, it has been used in order to assess epilepsy related searches [12], sexually transmitted diseases [13], Ebola related search queries during the 2014 outbreak [14], and to relate pertussis searches and incidence [15].

Big Data in general can be of value for the governments and policy makers with the analysis of online search queries. The online public interest could be assessed centrally and then applied by region in order to improve health locally i.e. integrate the analysis in Smart Cities. The aim of this paper is to examine how Google Trends’ data can be valuable in assisting with the evaluation of the interest in health issues in the US. We choose the terms ‘Asthma’, ‘Lyme disease’, ‘Melanoma’, ‘COPD’, and ‘Salmonella’, as representative terms of the public’s general interest. The rest of the paper is structured as follows: Section 2 consists of the research methodology, in section 3 the results are presented and discussed, and section 4 consists of the overall conclusions.

**2. Methodology**

We use the Google Trends’ [16] hits’ data from January 2013 to December 2015 to analyze the change in the online interest in the terms are ‘Asthma’, ‘Lyme disease’, ‘Melanoma’, ‘COPD’, and ‘Salmonella’ in the US. Data are normalized over each selected period and are downloaded online in ‘\*.csv’ format.

Furthermore, we analyze each term’s interest by State and we proceed to categorize the interest in terms of normalized hits in 5 groups: very high interest (80-100), high interest (60-80), moderate interest (40-60), fair interest (20-40), and poor interest (0-20). In addition, we provide the visualization of the data and examine if any consistencies exist amongst the States’ rankings of online interest and reported incidents.

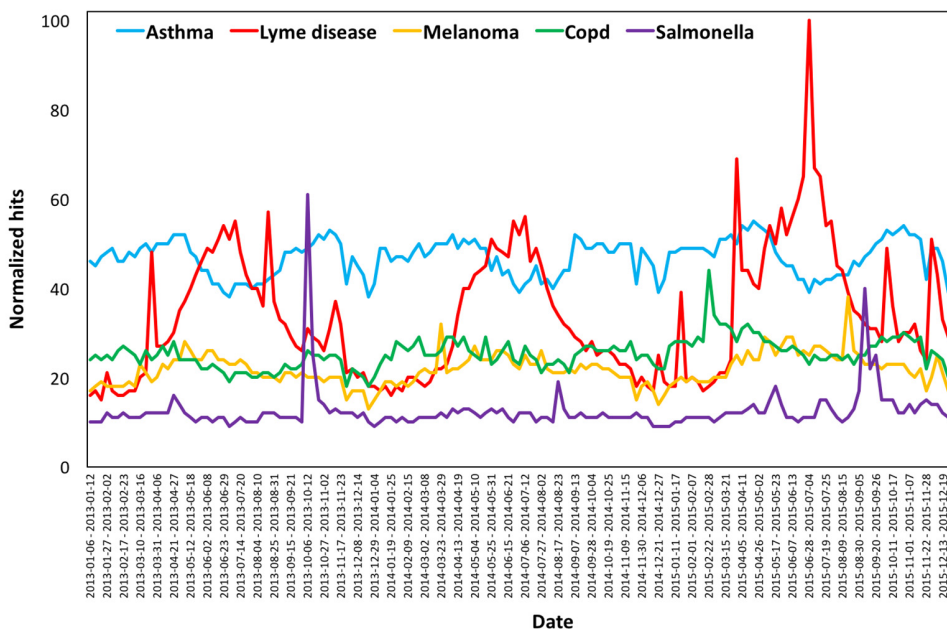


Fig. 1. Normalized hits in ‘Asthma’, ‘Lyme disease’, ‘Melanoma’, ‘COPD’ and ‘Salmonella’ in the US from 2013 to 2015.

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