

Accepted Manuscript

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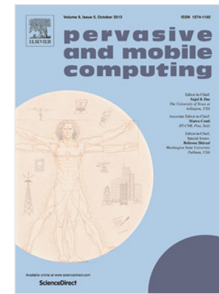
PII: S1574-1192(16)30441-2
DOI: <https://doi.org/10.1016/j.pmcj.2018.02.004>
Reference: PMCJ 923

To appear in: *Pervasive and Mobile Computing*

Received date : 22 December 2016
Revised date : 24 December 2017
Accepted date : 12 February 2018

Please cite this article as: T. Im, D. Coelho, K. Mueller, P. De, Smartphone based approximate localization using user highlighted texts from images, *Pervasive and Mobile Computing* (2018), <https://doi.org/10.1016/j.pmcj.2018.02.004>

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Smartphone based Approximate Localization using User Highlighted Texts from Images

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Abstract

In many application scenarios, an approximate location can suffice instead of achieving high accuracy of GPS, or other network infrastructure enabled localization. This can lead to design of localization systems low in resource consumption, and faster in obtaining a result. In this work, we design and implement a lightweight localization system, called WhereAmI, that can perform coarse localization with low resource requirement. The key intuition behind this work is that a collection of nearby textual signs in an image representing a user's surrounding forms a bag-of-words that provides a unique signature for her location. Due to the low performance of Optical Character Recognition (OCR) engine in outdoor settings, we develop a keyword-based positioning algorithm that can work even with partial errors in the detected texts representing business names. The partial errors in recognized business names are handled by using an n-gram-based text correction approach. We use a cloud based web service for offloading parts of the application workloads intelligently to save resources, like energy and network cost. The Android based prototype of WhereAmI is tested in uncontrolled environments. The experimental results show that WhereAmI can achieve 95% accuracy while consuming 20% less power than that of GPS. The proposed keyword-based positioning algorithm takes about 59 milliseconds on average for returning the location.

Keywords:

Outdoor Positioning, Content Based Image Retrieval, Signal based Positioning, Smartphone Sensing, Database Search, Pattern Matching, Energy Efficiency

1. Introduction

The proliferation of smartphones and wearables has allowed novel ways to determine user's location. Let us consider a scenario where a tourist is lost in a sprawling city with skyscrapers all around. The tourist has a smartphone, but she is running low on battery. GPS is not functioning well due to shadowing of the skyscrapers. Also, she is afraid of GPS draining the phone battery quickly. All she needs is an approximate idea of where she is on a map so that she can

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