

https://dspace.org/

Analyses of location-based services in Africa and investigating methods of improving its accuracy

Dahunsi, Folasade Mojisola

2012-07-19
http://hdl.handle.net/10539/11714

Downloaded from a DSpace repository. https://dspace.org/

ABSTRACT

The subject area of this thesis analyses the provision of location-based services (LBS) in Africa and seeks methods of improving their positional accuracy. The motivation behind this work is based on the fact that mobile technology is the only modern form of information and communication technology available to most people in Africa. Therefore all services that can be offered on the mobile network should be harnessed and LBS are one of these services. This research work is novel and is the first critical analysis carried out on LBS in Africa; therefore it had to be carried out in phases.

A study was first carried out to analyse the provision of LBS in Africa. It was discovered that Africa definitely lags much of the World in the provision of LBS to its mobile subscribers; only a few LBS are available and these are not adapted to the needs of the African people. A field data empirical investigation was carried out in South Africa to evaluate the performance of LBS provided. Data collected indicated that the LBS provided is not dependable due to the inaccuracy introduced by two major factors - the positioning method and the data content provided.

Analyzing methods to improve the positional accuracy proved quite challenging because Africa being one of the poorest continents has most mobile subscribers using basic mobile phones. Consequently, LBS often cannot be provided in Africa based on the capability of the mobile phones but rather on the capability of the mobile operator's infrastructure. However, provision of LBS using the network-based positioning technologies poses the challenge of dynamically varying error sources which affects its accuracy.

The effect of some error sources on network-based positioning technologies were analysed and a model developed to investigate the feasibility of making the RSS-based geometric positioning technologies error aware. Major consideration is given to the geometry of the BSs whose measurements are used for position estimation.

Results indicated that it is feasible to improve location information in Africa not just by improving the positioning algorithms but also by using improved prediction algorithms, incorporating up-to-date geographical information and hybrid technologies. It was also confirmed that although errors are introduced due to location estimation methods, it is impossible

to model the error and make it applicable for all algorithms and all location estimations. This is because the errors are dynamically varying and unpredictable for every measurement.