CORRELATION OF THE POSITIONAL ERRORS AT NEARBY STATIONS OBTAINED BY MOBILE PHONE A-GPS

Karandana C.A.[1*], Kanaththage P.S.[2] and Panawala P.A.G.S.[3]
[1]Department of RSGIS, Faculty of Geomatics, Sabaragamuwa University of Sri Lanka, Sri Lanka
[2]Survey Department of Sri Lanka
[3]Deparment of SUGEO, Faculty of Geomatics, Sabaragamuwa University of Sri Lankay, Sri Lanka
*karandana@geo.sab.ac.lk

The accuracy requirement of location information provided by a GNSS enabled device varies with the application. Surveying grade accuracy requirement of a location is generally around centimetres. The horizontal positional accuracy obtained by a mobile phone location service with A-GPS (Assisted GPS) has been reported as 5.0 – 8.5m. Therefore the mobile phone A-GPS is not suitable for higher grade applications yet. Although it has limitations to obtain a higher accuracy using mobile phones hardware, the requirement for a higher accuracy is growing up for many applications. Rather than improving the accuracy of the location output by relying on a single station observation, differential correction methods would be applicable if there is a correlation between the errors at different stations. Therefore the objective of this study is to find the correlation between the locational errors that occurred over time at nearby stations observed by mobile phones. As an experiment, 6 well-known stations were observed using 6 mobile phones simultaneously over a 15 minutes duration with a 1-second logging interval. Three stations out of the six were located in a middle of a playground which was assumed as having the least disturbance to the satellite observation and the rest of the three stations were located near to trees, buildings, and roads. Pearson's correlation coefficient was calculated for the latitude error, longitude error, distance error and the angle error of each pair of observations at the same timestamp. The average of the coefficients of above errors at stations with similar conditions was 0.76, 0.73, 0.69 and 0.78 respectively. For the station with different conditions, the average of the coefficients was 0.62, 0.59, 0.67 and 0.60 respectively. The minimum correlation between any pair of errors was found as 0.53. With these results, it was proven that there is a higher positive correlation between the errors occurring during location observations by mobile phones. Also, the conclusion of this study shows the applicability of the differential correction methods for mobile phone location observations in order to enhance the accuracy of the output.

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