# Improved Image Retrieval for Efficient Localization in Urban Areas Using Location Uncertainty Data

**Authors :** Mahdi Salarian, Xi Xu, Rashid Ansari

**Abstract :** Accurate localization of mobile devices based on camera-acquired visual media information usually requires a search over a very large GPS-referenced image database. This paper proposes an efficient method for limiting the search space for image retrieval engine by extracting and leveraging additional media information about Estimated Positional Error (EP E) to address complexity and accuracy issues in the search, especially to be used for compensating GPS location inaccuracy in dense urban areas. The improved performance is achieved by up to a hundred-fold reduction in the search area used in available reference methods while providing improved accuracy. To test our procedure we created a database by acquiring Google Street View (GSV) images for down town of Chicago. Other available databases are not suitable for our approach due to lack of EP E for the query images. We tested the procedure using more than 200 query images along with EP E acquired mostly in the densest areas of Chicago with different phones and in different conditions such as low illumination and from under rail tracks. The effectiveness of our approach and the effect of size and sector angle of the search area are discussed and experimental results demonstrate how our proposed method can improve performance just by utilizing a data that is available for mobile systems such as smart phones.

**Keywords :** localization, retrieval, GPS uncertainty, bag of word

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