

Localisation Systems Repository: A Platform for Open-source Localisation Systems and Training Datasets

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With smartphones becoming the most pervasive technology, estimating their exact location can enable a range of context-aware applications, from simply tracking users and goods to building security and space planning. Though this task is fairly trivial outdoors by relying on the GPS, attempting it indoors poses several limitations ranging from the lack of GPS signal to unpredictable wireless propagation conditions. Considering the stringent need for such solutions for warehouses, shopping malls, airports and museums, devising these technical solutions is now more important than ever to enable the next generation of assistive services. Vast research efforts have been devoted to building indoor localisation systems, with many solutions emerging over the last few years. The main objective of our targeted class of localisation systems is to provide continuous, reliable and accurate positioning on smartphone devices. However, despite innovative research and commercial significance, the indoor localisation problem is still considered unsolved, as the research community has not converged to a single, widely accepted solution that can achieve the desired accuracy at the required cost.

Although research in this field has been fruitful and abundant, the research space is currently disorganised, limiting advancements. Though many indoor localisation solutions have been proposed, few have their code and datasets publicly available. Many researchers are not publishing the source code for their localisation systems due to possible commercial ambitions inspired by recent successes such as Wi-FiSLAM being acquired by Apple, and to avoid their system being evaluated in less than ideal conditions.

This creates a barrier in terms of accessing the work already performed in this field. It is difficult to compare new solutions to the already existing ones, or to improve upon previously proposed systems, as the existing solutions need to be reimplemented from scratch, which represents a significant effort.

We do not consider this healthy for our research field. This motivates us to develop a platform, where we include the most relevant existing solutions for indoor localisation, their implementation (source code), a performance evaluation, and sizeable datasets for other researchers to use for development and evaluation of their own systems. The platform is open to everyone, accepting contributions to improve existing implementations and to add new solutions and datasets. Any solutions proposed in literature can be implemented by anyone and their implementation quality is assessed based on their performance on the available datasets and by the community. Researchers are motivated to upload their own solutions themselves, to benefit from the exposure offered by the platform (through ease of comparison with other systems in uniform evaluations) and to ensure a fair evaluation of their work.

Our platform aims to achieve three main benefits for the indoor localisation research community. Firstly, to offer the largest benchmark suite, containing sensor data collected with smartphones from many indoor and outdoor locations around the world. Secondly, to motivate active competition in the field by creating an open challenge where systems are evaluated on a common dataset. Ranks are continuously updated with new submissions. Thirdly, to create a repository where the source codes of localisation systems can be accessed and improved by the community.

We are inspired by the computer vision field where a few years ago a similar fragmentation was unified by the IMAGENET dataset and the competitions organised by this group. We believe that our platform will be the catalyst for the localisation community to open-source their code, share datasets and compete in achieving the best localisation systems.