

This work explores how Multi-Label Classifiers can be used to dynamically choose complimentary Visual Place Recognition techniques to create a more robust place recognition system

Motivation

For robust operation within an environment, visual place recognition (VPR) must be able to localize mobile platforms under a diverse range of adverse conditions



The best performing VPR technique will vary depending on the condition changes experienced within the dataset/environment







This can be somewhat addressed by fusing/combining multiple complimentary VPR techniques. However, this does not fully resolve the issue as the optimal combination of techniques can vary even within the same dataset/environment



We use a multi-label approach to improve on this method by dynamically switching between VPR technique combinations to make a system more robust in all adverse conditions



Boosting Performance of a Baseline Visual Place Recognition Technique by Predicting the Maximally Complementary Technique

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Multi-Label Classification for MRR Technique Switching/LAD +)

Selecting the best combination of VPR techniques for a query is inherently a multi-label problem. Forsmany RegionVLAD query there can be multiple combinations and find the second seco techniques which will successfully localize the platform

In this work we simplify the problem by selecting the best additional technique to fuse with a *given* base technique



We utilize NetVl LAD base our as technique and take the first 128 principal components as the input to a small fully connected multilayer perceptron (MLP)

Benefits

- Creates a VPR system robust across significant environment, illumination, viewpoint and structural changes
- lightweight Extremely and negligible overhead to system
- **Dynamic** query to query switching

Limitations

- Reference feature vectors and network models for all VPR techniques used must be stored
- Multi-label data labeling required to train

Future Work

- Improve training pipeline to more effectively switch for greater performance
- Optimize for alternative goals, such as preventing critical failures



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