

Visual Place Recognition: A Tutorial

IEEE Robotics & Automation Magazine



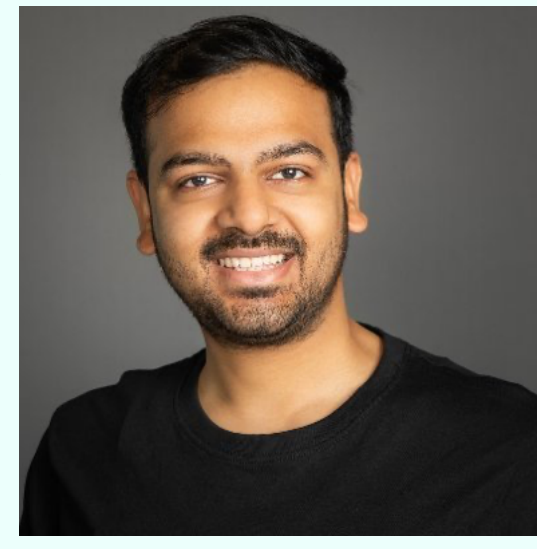
Stefan Schubert



Peer Neubert



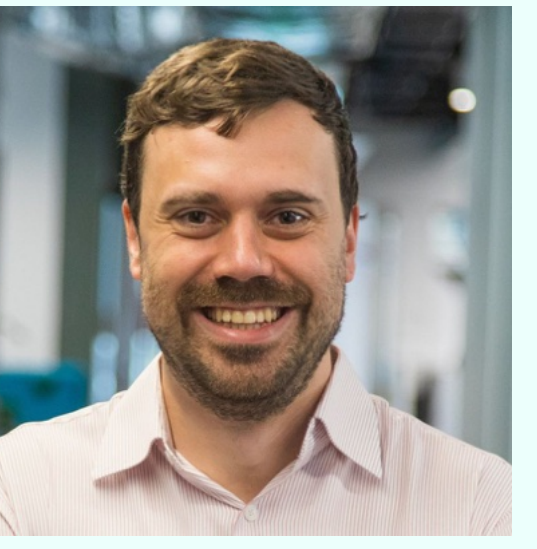
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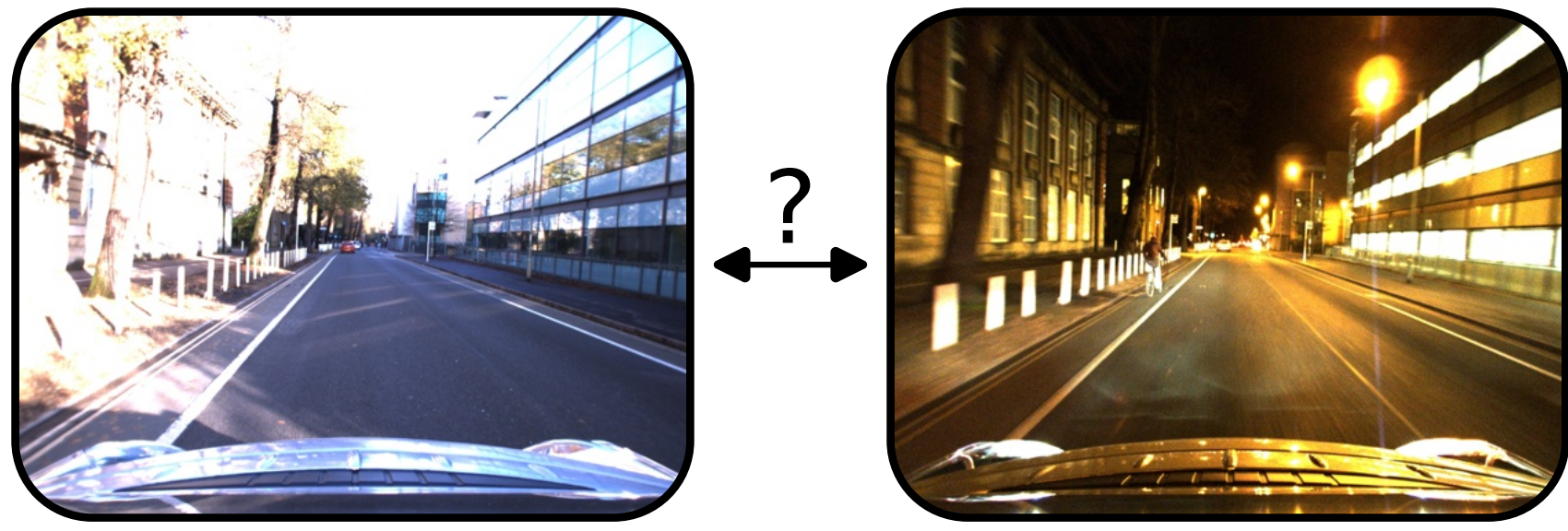
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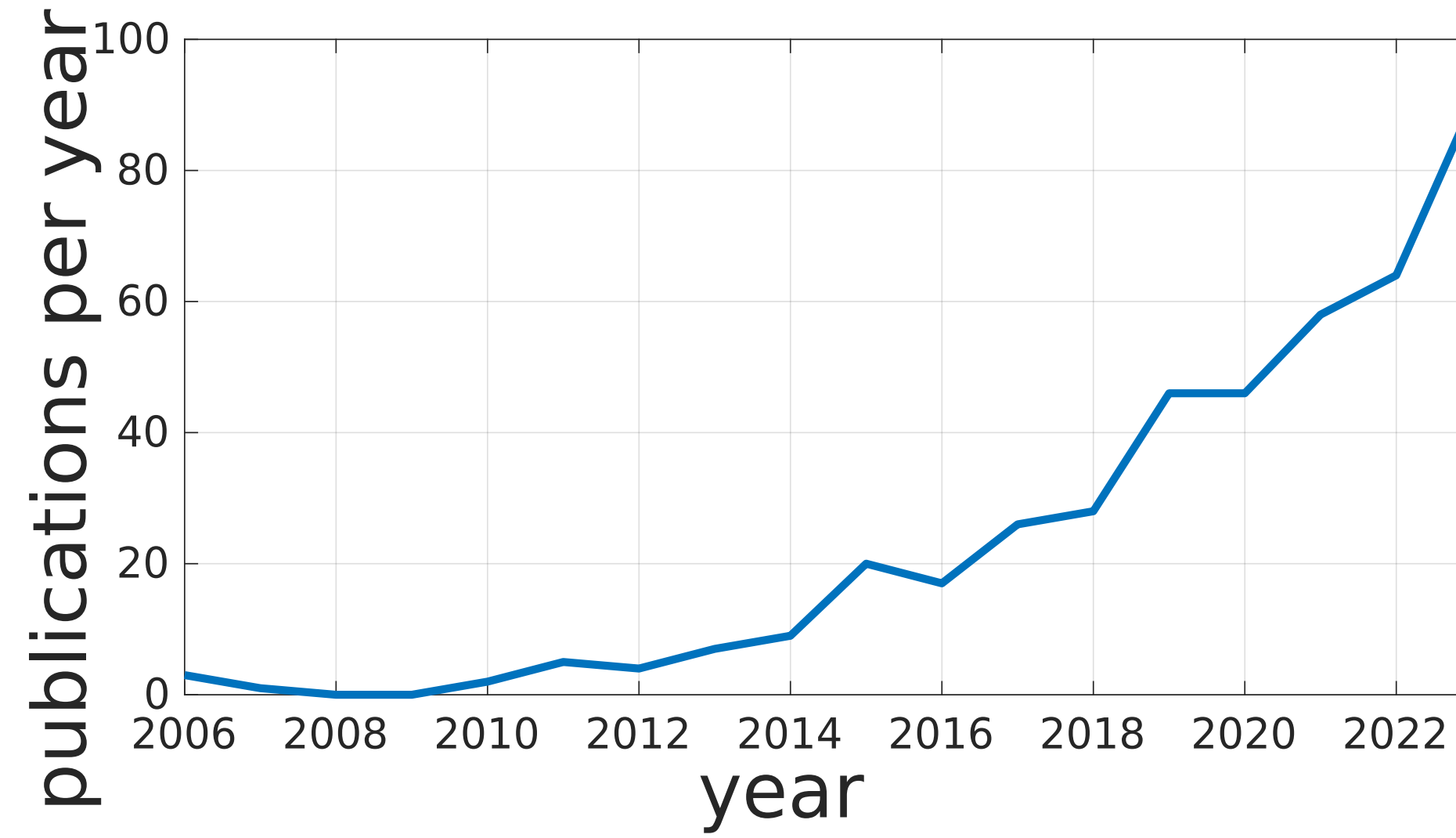
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Visual Place Recognition (VPR)



- Use cases:**
- Loop closure detection for SLAM
 - Visual localization
 - Multi-robot / multi-session mapping



Who is the tutorial for?

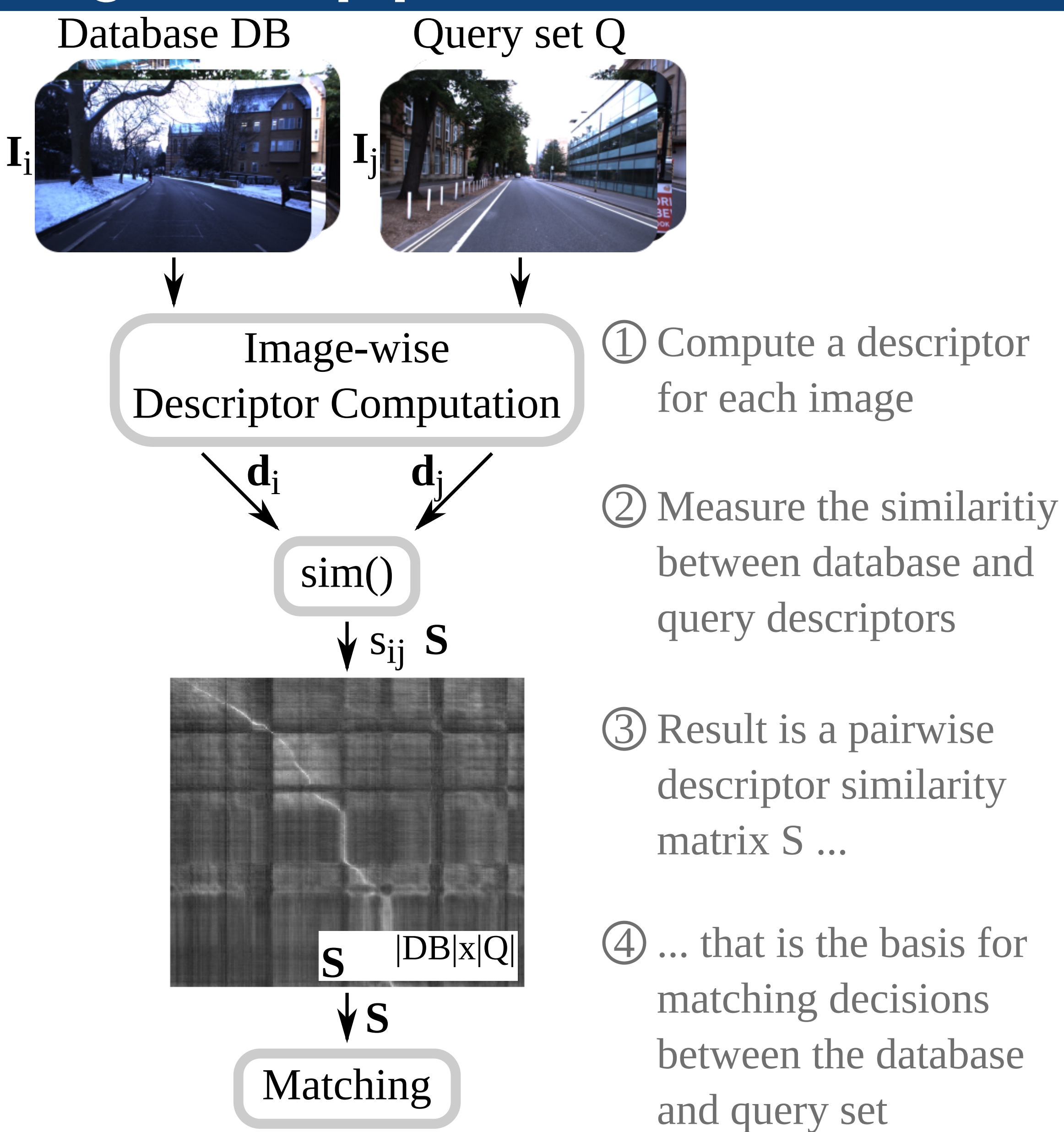
Newcomers to the field:

- Systematic introduction to the field
- Formulation of the VPR problem
- Generic algorithmic pipeline
- Evaluation methodology for VPR approaches
- Major challenges for VPR

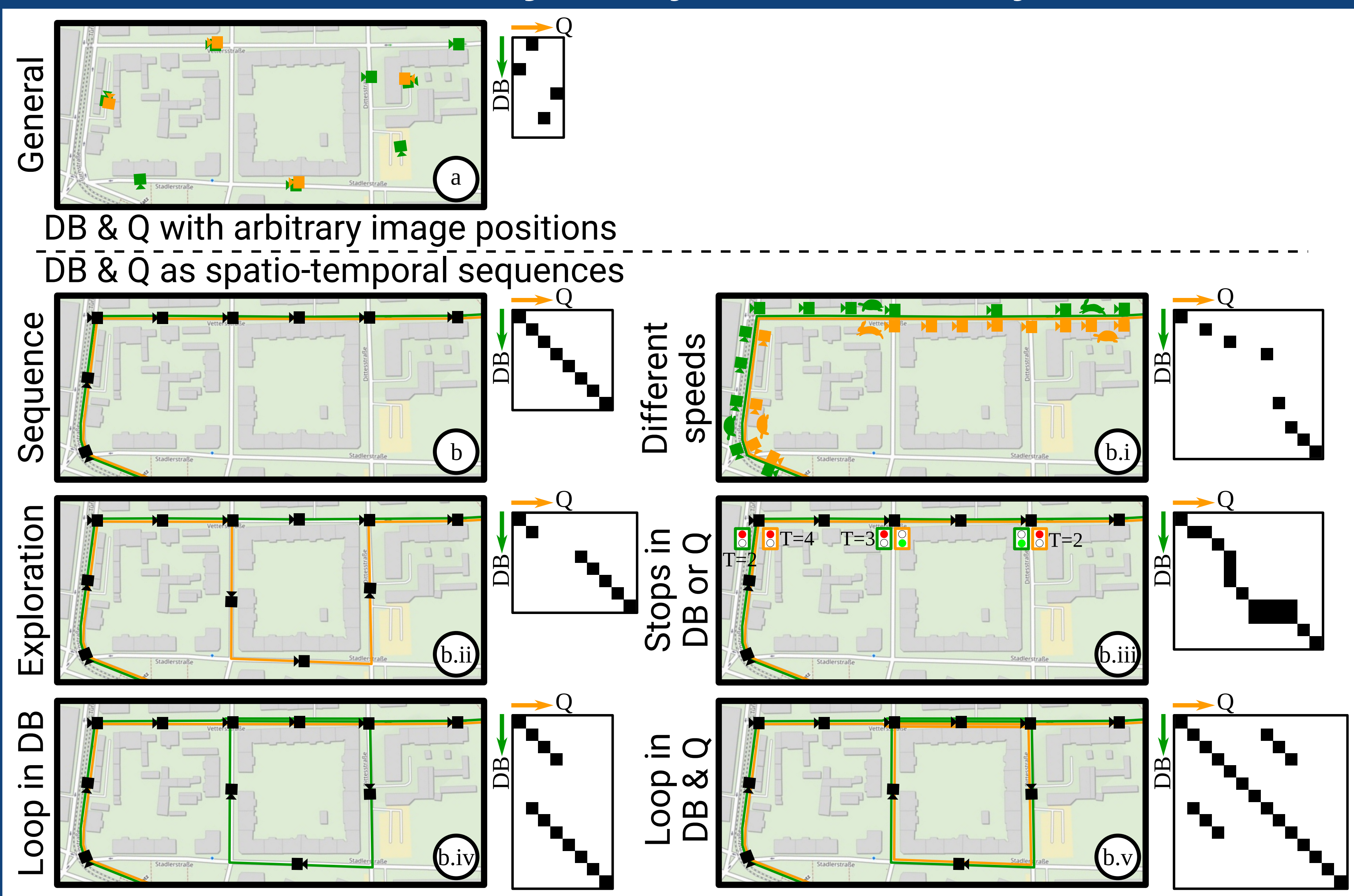
Researchers acquainted with the VPR problem:

- Intricacies of different VPR problem types
- Subtleties behind the evaluation of VPR algorithms

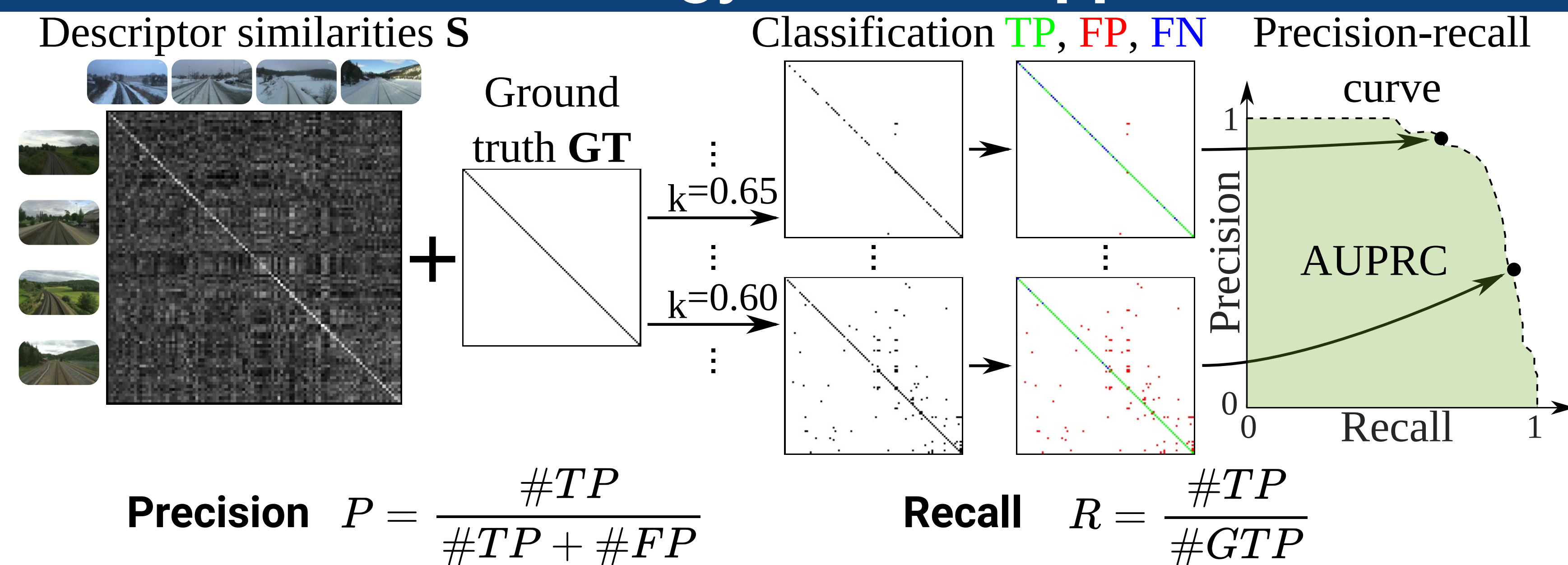
A generic pipeline for VPR



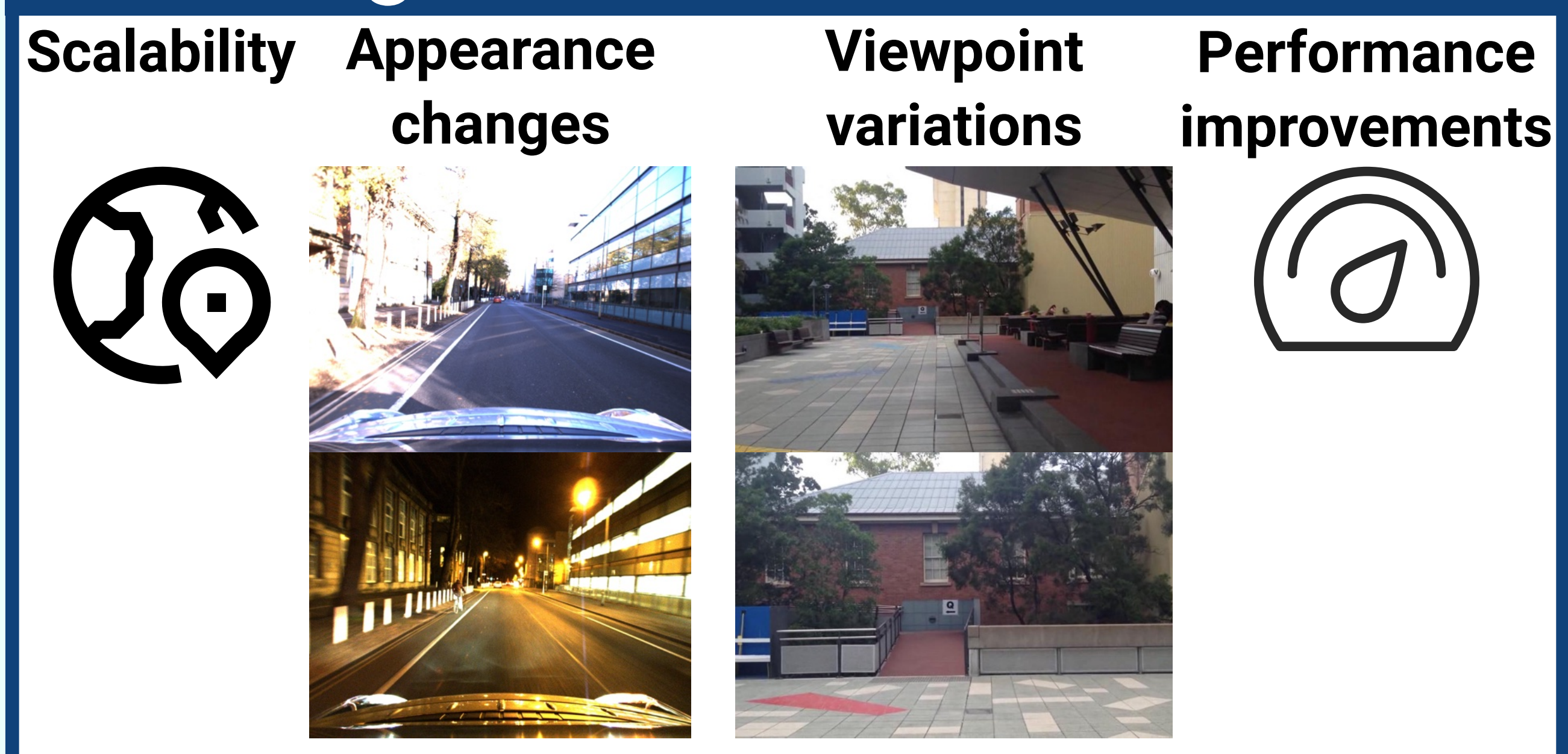
Relation between trajectory and similarity matrix S



Evaluation methodology for VPR approaches



Challenges and how to address them



VPR problem categories

	Data processing		
	Online VPR	Batch VPR	Output:
Single-session VPR	Online SLAM	Mapping	• Single-best-match VPR $\#GTP = \sum_{i,j} \begin{cases} 1, & \text{if } \exists i : gt_{ij} \\ 0, & \text{otherwise} \end{cases}$
Multi-session VPR	DB grows	DB const.	• Multi-match VPR $\#GTP = \sum_{i,j} \begin{cases} 1, & \text{if } gt_{ij} \\ 0, & \text{otherwise} \end{cases}$
	Multi-Robot Mapping	Visual (Re-)Localization	

Paper & Code



Open Access!

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https://github.com/stschubert/VPR_Tutorial