SeqSLAM[1]

Final Presentation and Live Demo

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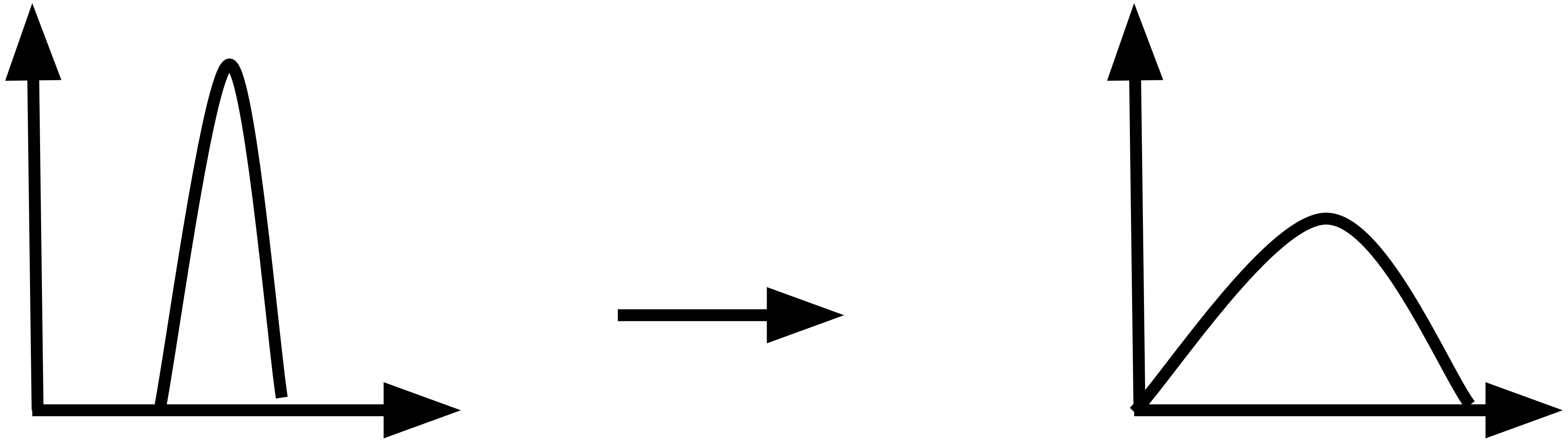
The Problem

Recognition of recurring sceneries under changing environmental conditions:

- Camera input
- Saving compressed frames
- Applying algorithm to search for suitable matches
- Several improvements to fulfill given requirements

Preprocessing

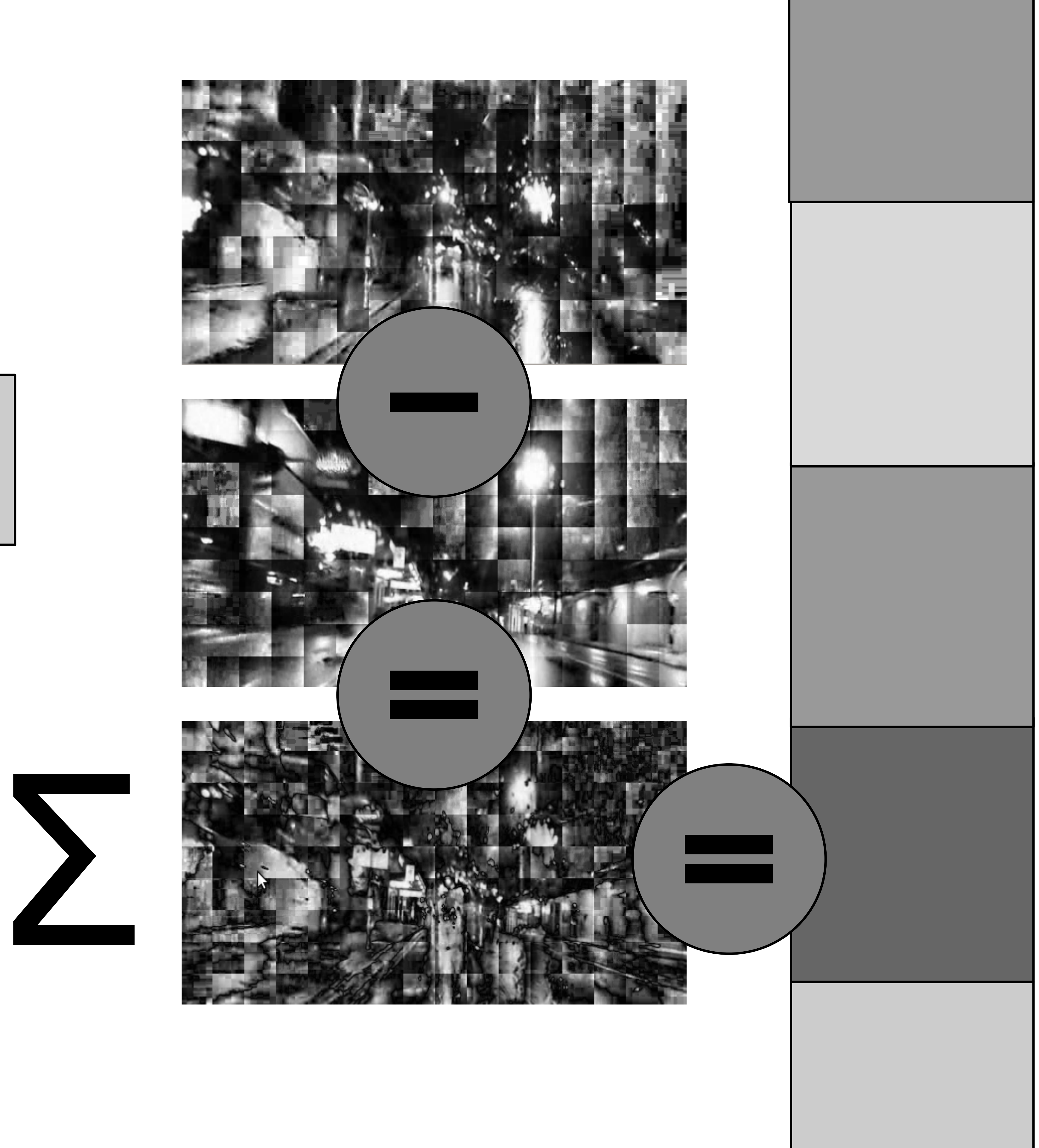


Store compressed information without loosing relevant information:

- Convert to grayscale
- Scale down to **64 x 36**
- Contrast enhancement: stretch histogram, patch based

Matching

- Calculate image difference value for each template
- Local Contrast Enhancement
- Localized Sequence Recognition



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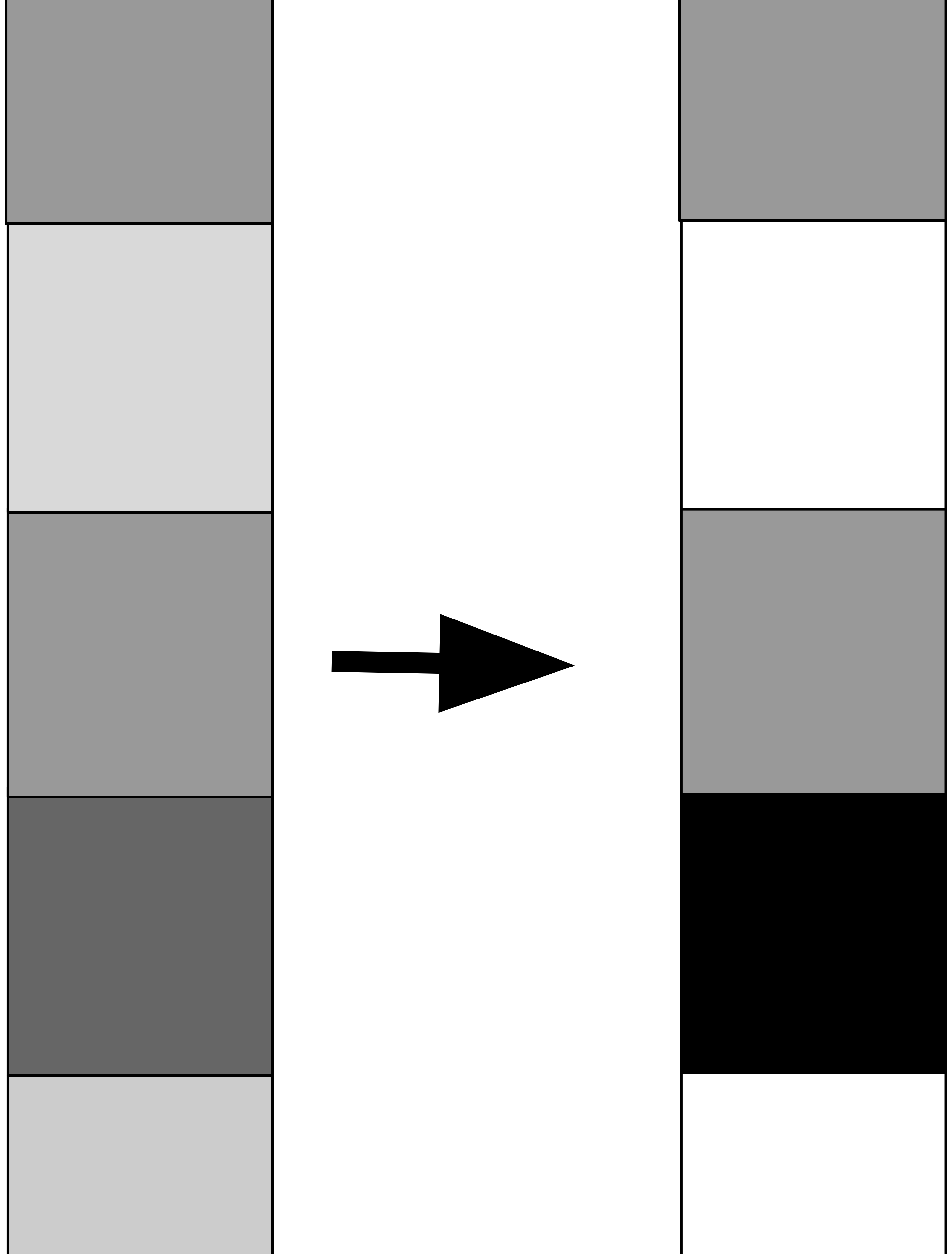

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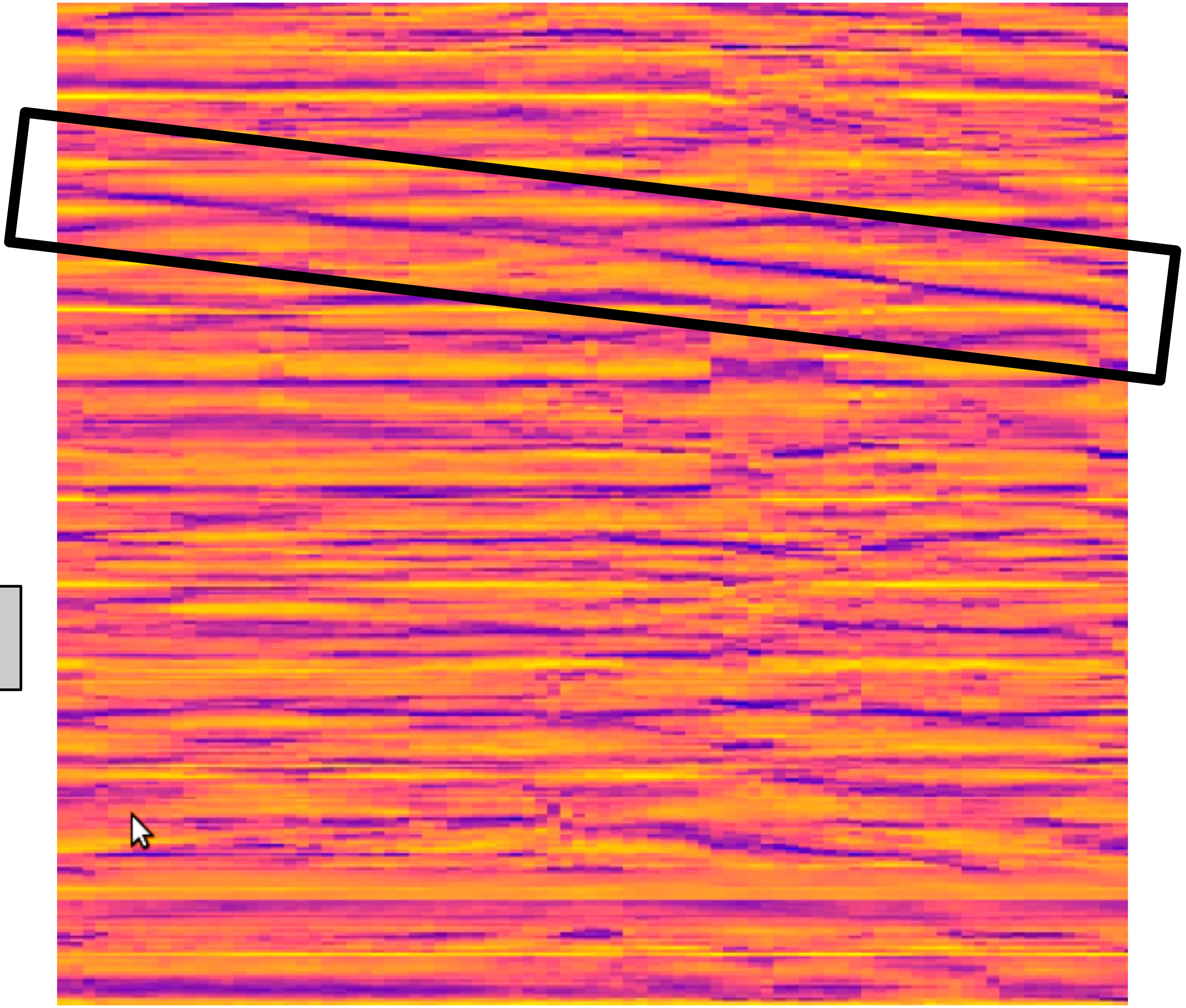
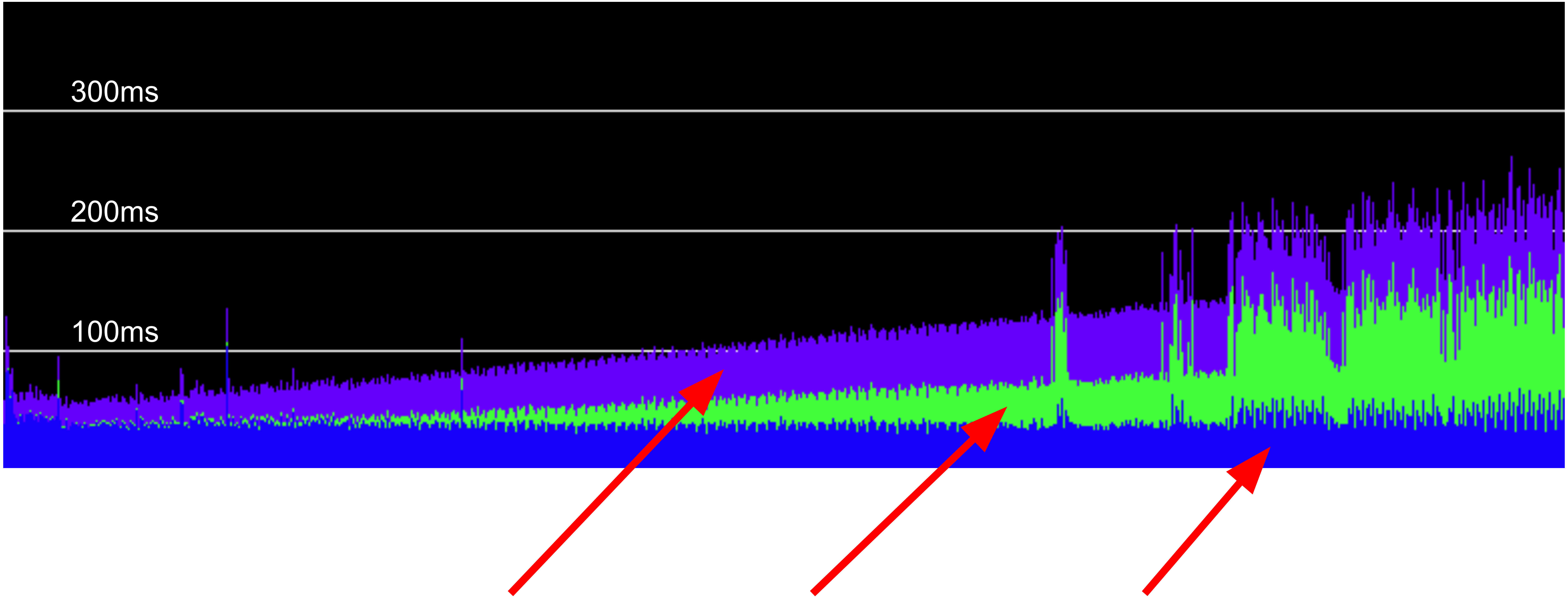


Image difference matrix

Performance

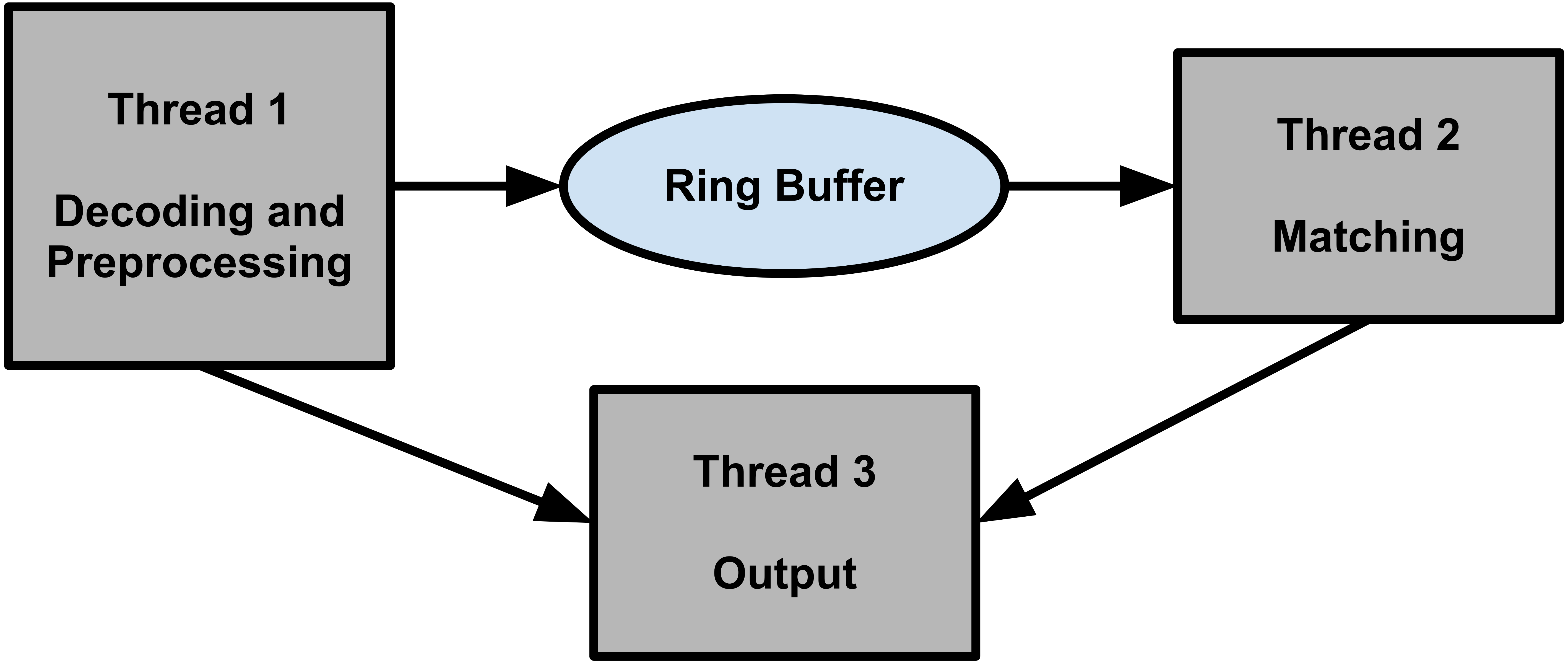


Graphical
Output

Matching

Decoding and
Preprocessing

Enhancements - Multithreading



Enhancements - Stationary Frame Detection

Results

➡ Successful implementation of SeqSLAM

➡ Robust matching under changing conditions

➡ Multiple times faster than realtime performance

Outlook

- SeqSLAM could be used as independent visual positioning system
- Further improvements by intelligent template learning
    - Learning rate coupled with vehicle speed
    - Online aggregation of subsequent runs with changing environment

Schedule

Week 1	● Read paper ● Understand topic ● Create schedule	Done! Done! Done!
Week 2	● Start implementation ● Preprocess datasets ~~and create bagfiles~~ ● Generate first basic output (matches side by side)	Done! Done! Done!
Week 3	● Implementation: final stage ● Testing ● Bug fixing ● Evaluation of matching quality and performance	Done! Done! Done! Done!
Week 4	● Parameter tuning ● Improvements (quality / performance) ● Enhancements ● Final presentation	Done! Done! Done!

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The End

[1] Michael Milford, Gordon Fraser Wyeth: SeqSLAM: Visual route-based navigation for sunny summer days and stormy winter nights. ICRA 2012: pp. 1643-1649