

Machine Learning-based Indoor Localization for Micro Aerial Vehicles

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27th July 2016

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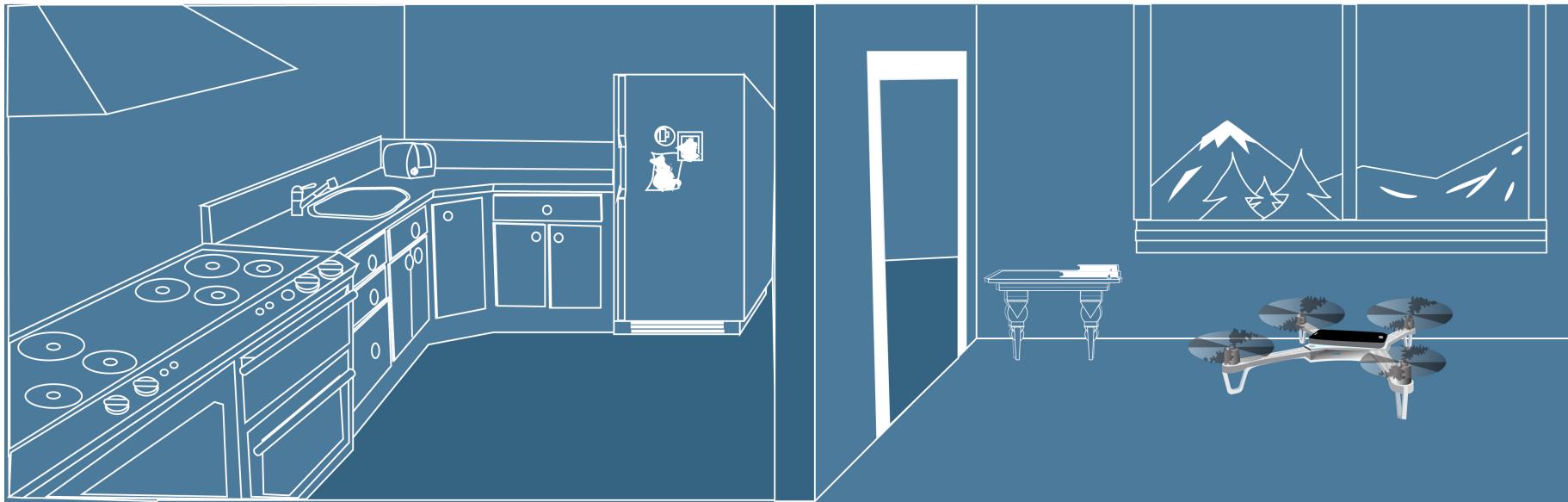
Louis Vuurpijl



TU Delft Delft
University of
Technology

Guido de Croon
Roland Meertens

MOTIVATION



MOTIVATION

Research Question

Can accurate indoor localization be done on a very limited platform?

RESEARCH QUESTIONS

Research Question 1

Can accurate indoor
localization be done on a very
limited platform?

Research Question 2

Can accurate indoor
localization be with synthetic
data only?

Research Question 3

Can we predict the fitness of
a given environment?

SETTING

Camera



Processor



Datalink



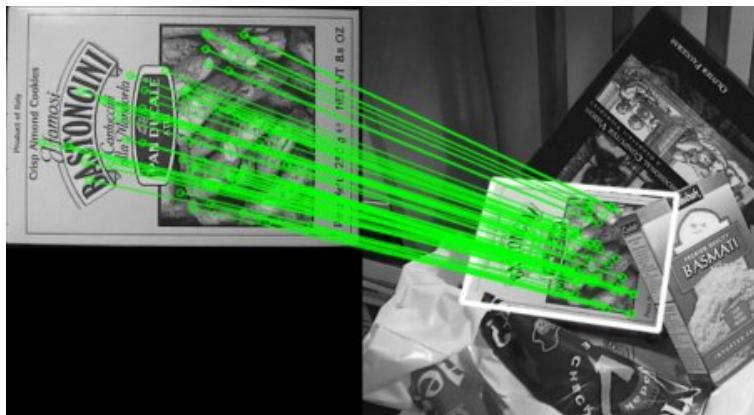
OUTLINE

- Existing Methods
- Machine Learning-based Approach
- Flight Tests & Simulations
- Discussion & General Discussion
- Conclusion & Future Work

OUTLINE

- Existing Methods
- Methods
- Experiments and Results
- Discussion
- Conclusion

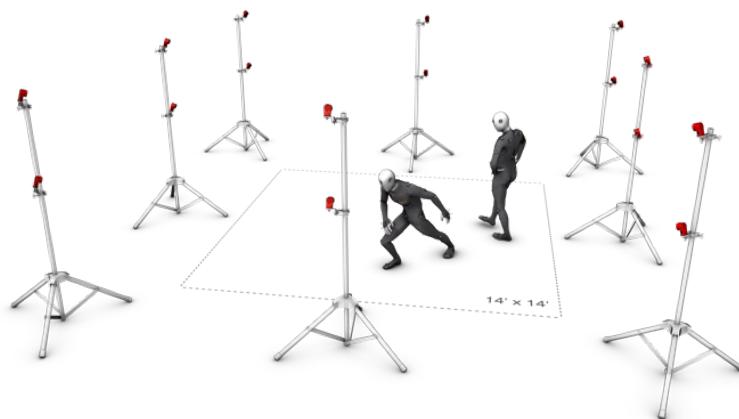
METHODS FOR INDOOR LOCALIZATION



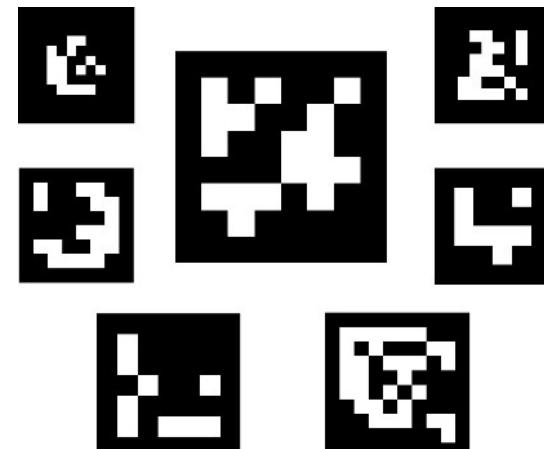
SIFT + homography finding



Laser range finder

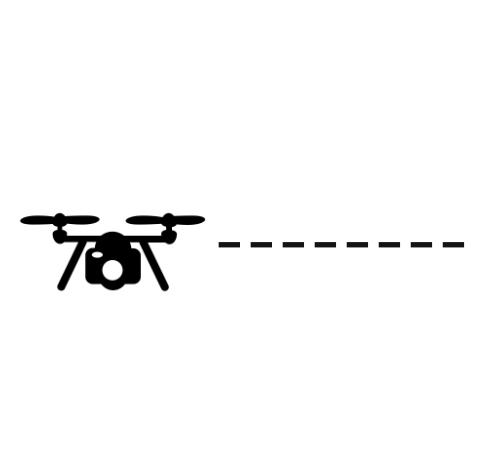
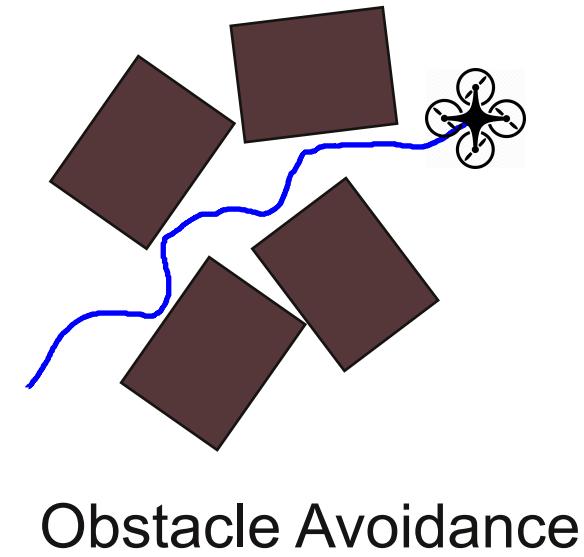
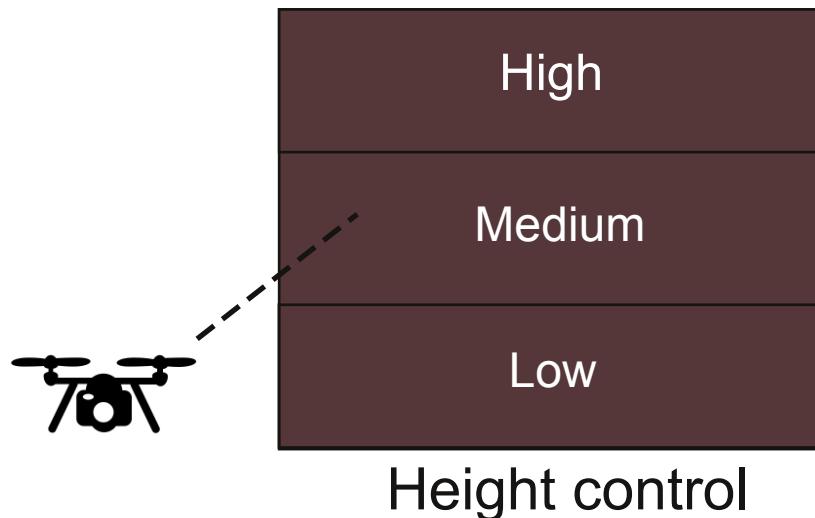


Motion tracking system



Markers

FOUNDATION



Distance Measurement

CHALLENGES / CONTRIBUTIONS

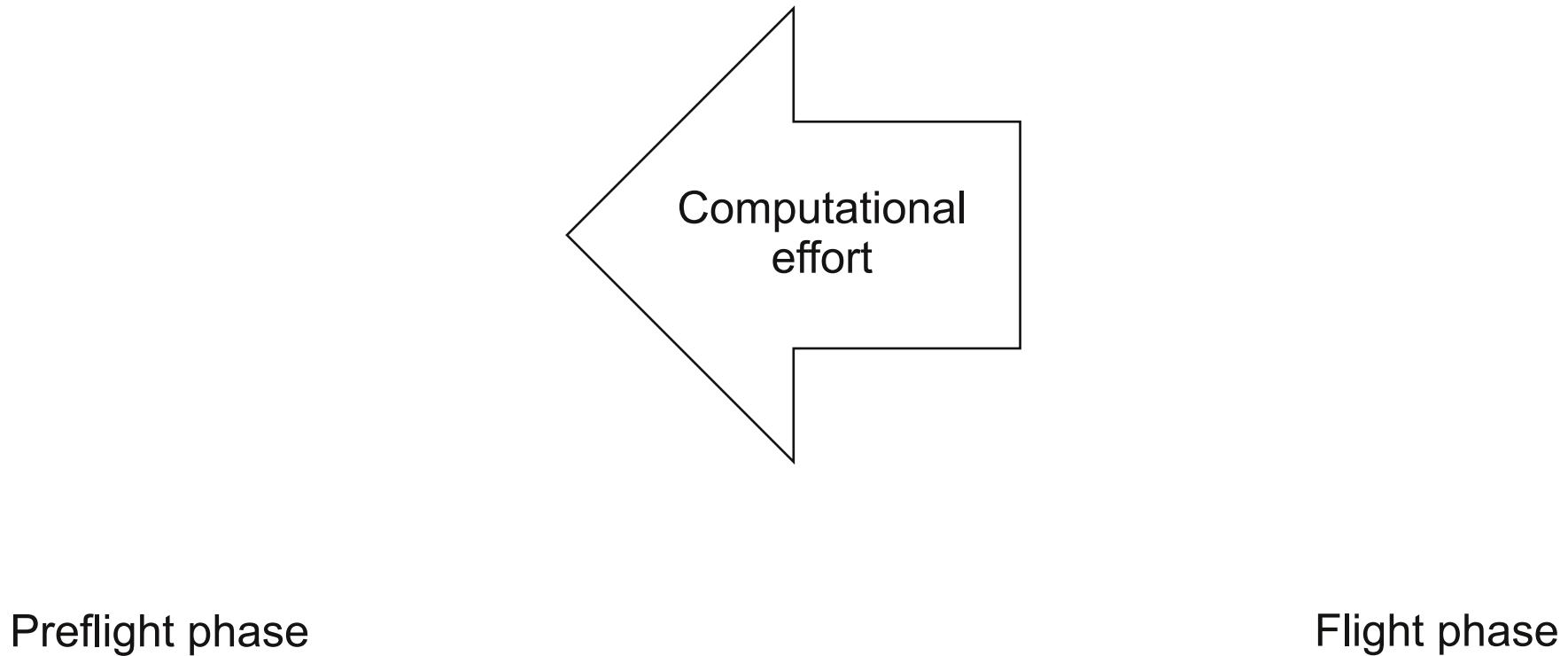
Continuous regression problem

Low performance platform

Embedded systems programming (C)

Ground truth estimation

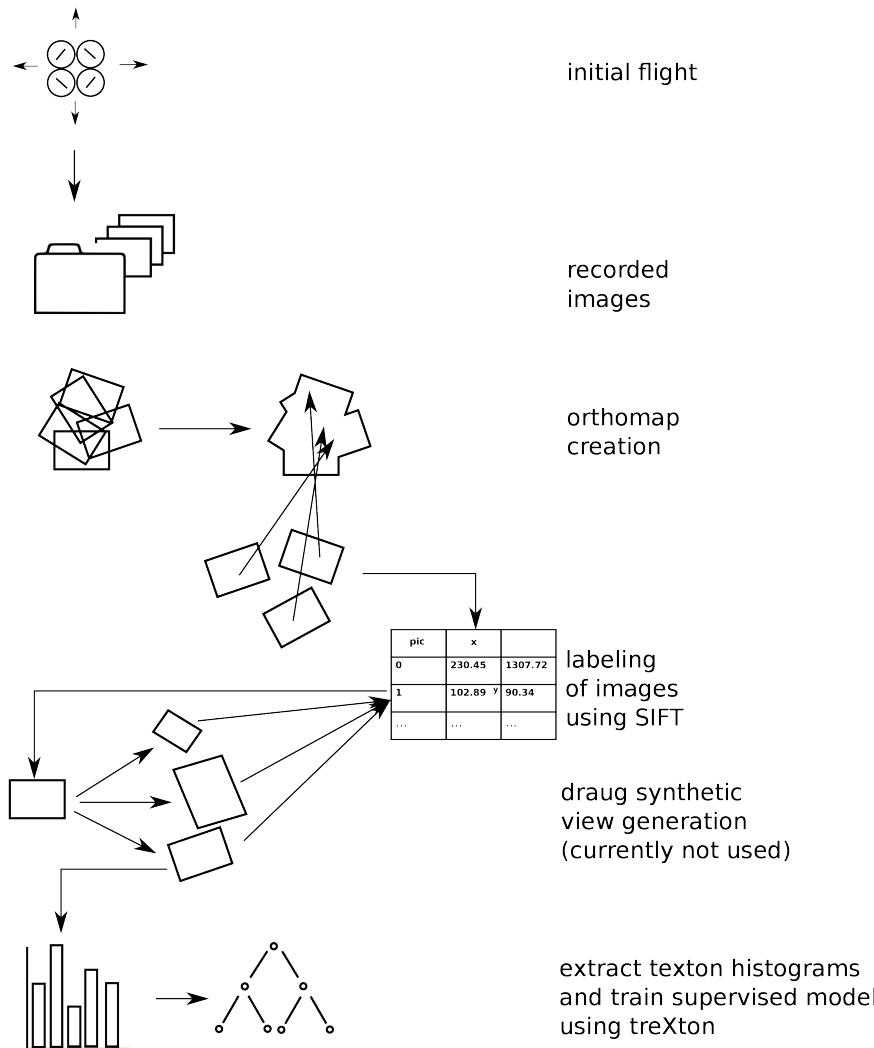
IDEA



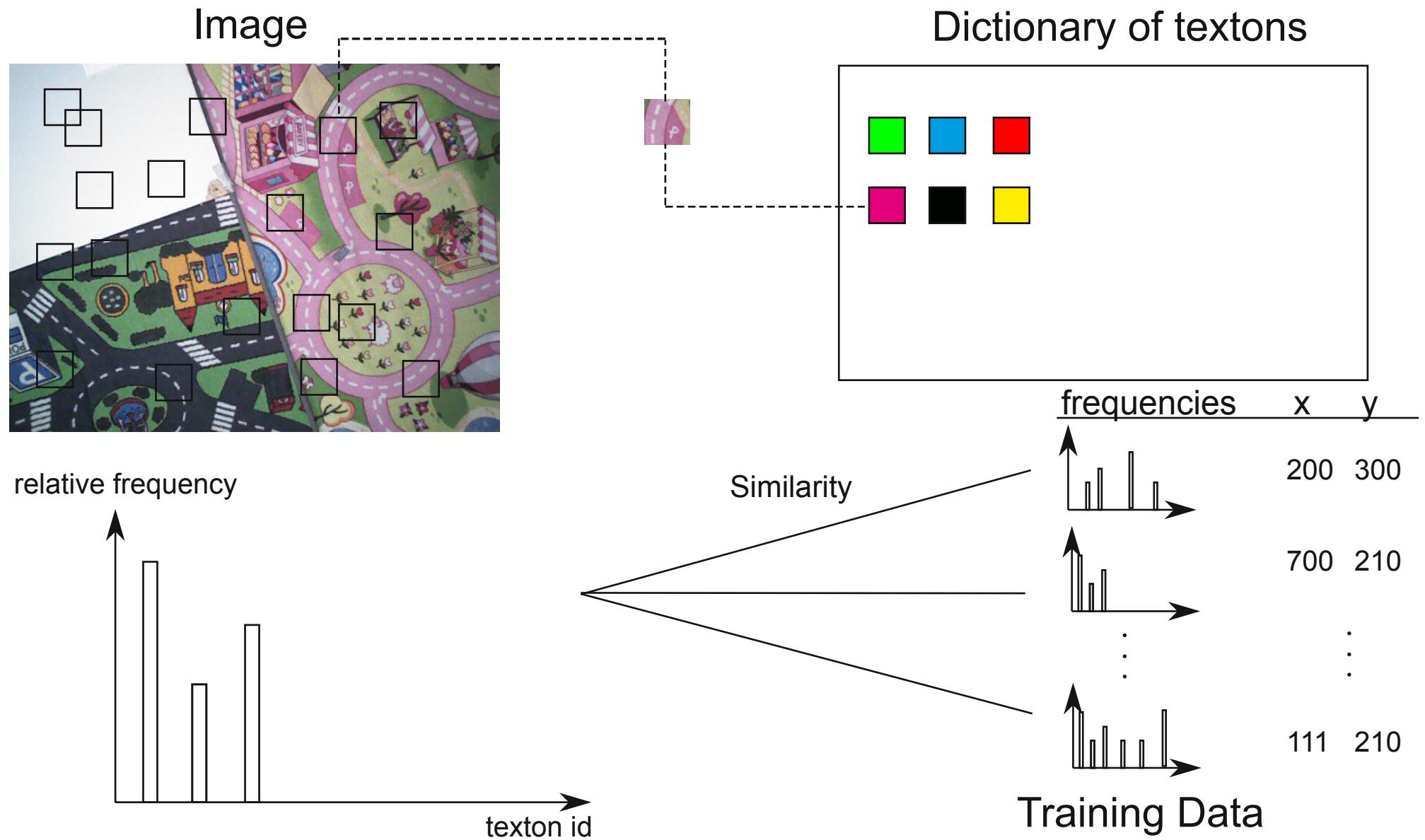
OUTLINE

- Related Work
- Methods
- Experiments and Results
- Discussion
- Conclusion

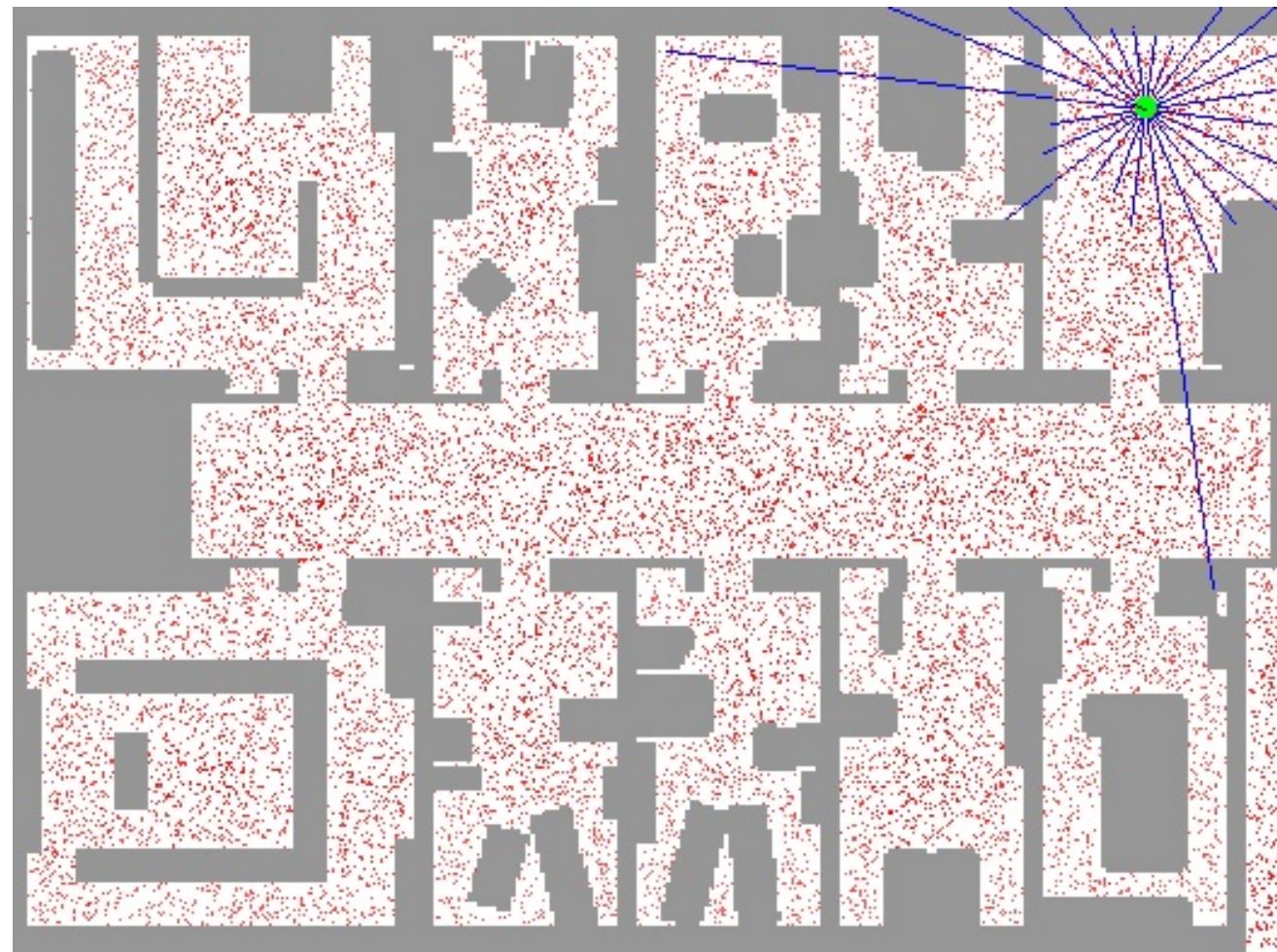
MACHINE-LEARNING APPROACH



MACHINE-LEARNING APPROACH

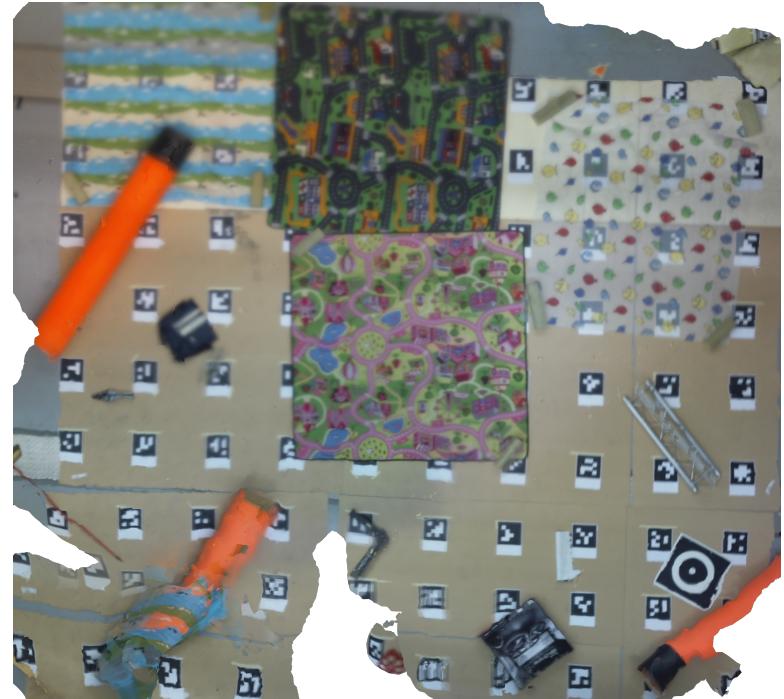
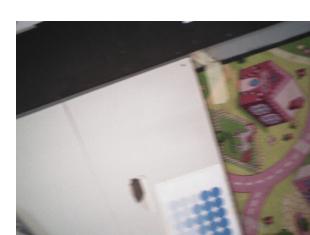
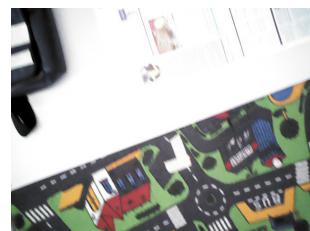


PARTICLE FILTER



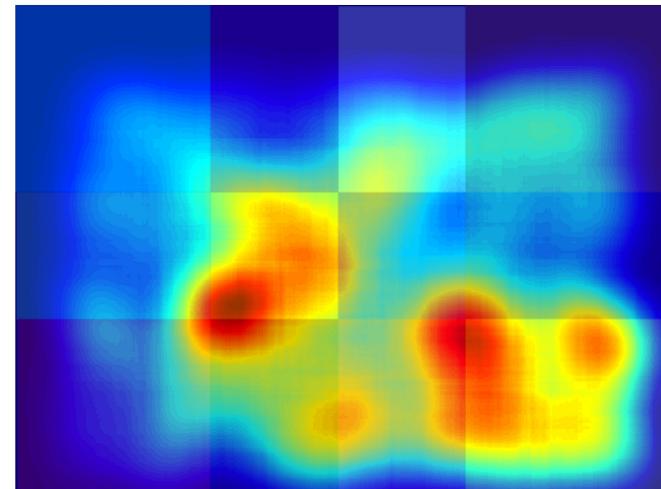
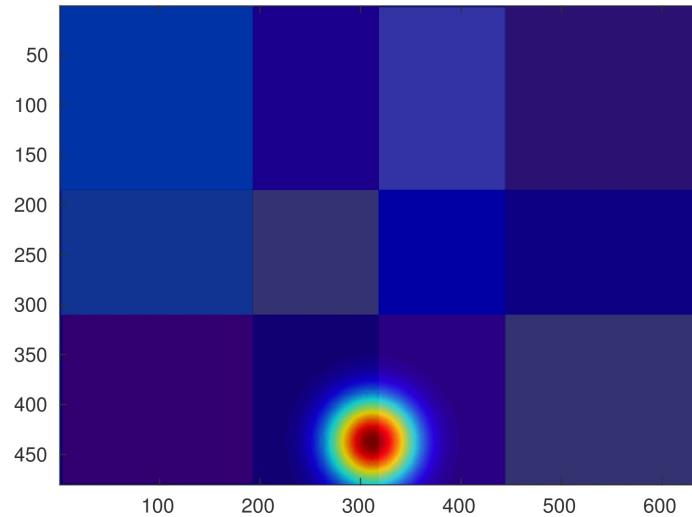
GROUND TRUTH ESTIMATION

ORTHO MAP CREATION

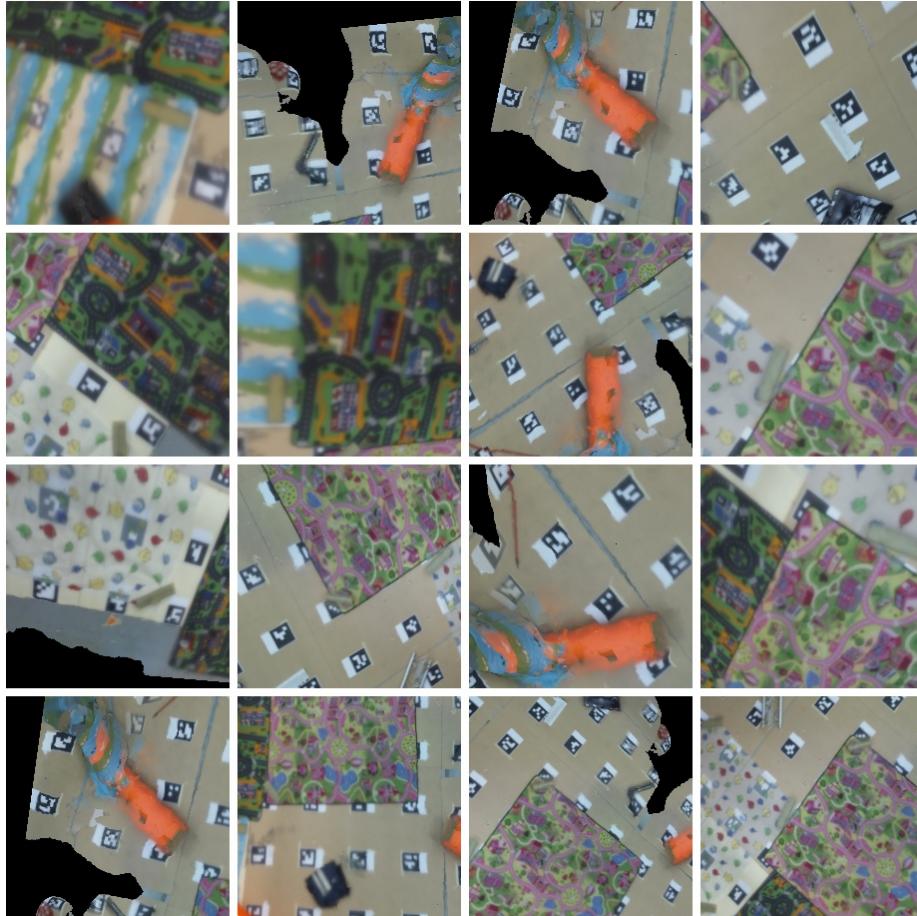


ENVIRONMENTAL MODIFICATION

MAP EVALUATION



SYNTHETIC FLIGHT



OUTLINE

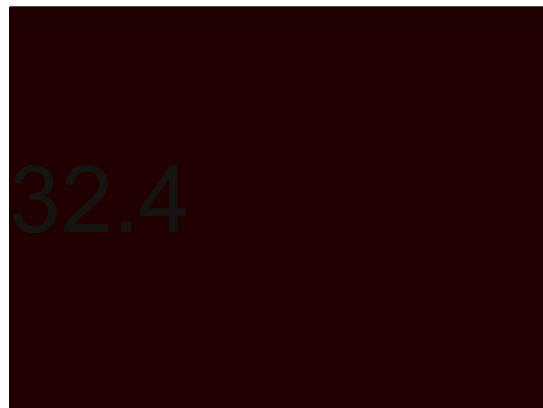
- Related Work
- Methods
- Experiments and Results
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EXPERIMENTS

EXPERIMENTS



EXPERIMENTS



DISCUSSION

CONCLUSION

EFFICIENT INDOOR LOCALIZATION

