KTH Computer Science
and Communication

Learning from Structures for Long Term Autonomous Robots

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Abstract

Here is my Abstract

Sammanfattning

The Swedish Abstract

Acknowledgments

Thank everyone here

Contents

Introduction

Chapter 1

Finding Structure

Towards Spatial Relationships: KTH-3D-Total Dataset

- See if you can convert Matterport pointclouds into 2D projections
- Matterport arXiv paper and hosting?
- KTH 3D Total hosting

Chapter 2

Describing Spatial Structure

Qualitative and Quantitative Spatial Relations

1 Spatial Relations - Intro

- why use it?
- language and description
- compression - topological descriptions
- mapping and directions

2 RELATED WORKS

3 Spatial Relations for our problem

4 Task description - object recognition

Talk about aiding the vision system and why? Extrinsic cues.

5 INSERT PAPER - AAAI QSR

6 Spatial Relations recommendations

Take the discussion section from paper and elaborate. When to use what SR and why should QSRs be measureable?

7 SR for STRANDS?

How to go forward from this analysis?

8 INSERT PAPER - IROS QSR

Discuss practical issues

Chapter 3

Designing Spatial Relations

Joint Object Classification with Intrinsic Frame of Reference Calculi

IFRC

1 What kind of spatial relations to design?

2 Why IFRC?

TODO: Insert the linguistic experiment data. Conclusions drawn from it – elaborate.

3 INSERT PAPER- IFRC

4 Discussion

Difficulties of Joint Object Classification.

Elaborate discussion of joint object classification with IFRC. What can be improved? What are the pitfalls?

Chapter 4

Object Estimation

Bayesian Optimisation based Multiple Instance Estimation

1 Difficulties of Object Estimation

- Multiple instances
- Only extrinsic features
- small data
- multiple instances – explain different location hits

2 RELATED WORKS - Object Estimation

Focus: Non parametric methods for Object Estimation

3 INSERT PAPER – Bayesian Optimisation for Object Estimation

4 Discussion

Chapter 5

Making the Environment Continuous

Finite Mixture Models for Stochastic Kronecker Graphs

1 Environment Recognition

- Why constrain to objects?
- Generalise to all kinds of environments. Football scenes, Chess boards, Crime scenes
- Key points - large network graphs
- Use large networks to analyse
- place in this context environment recognition in office places
- elaborate on nodes, graph construction, edges what ARE nodes in interpretation.

2 Kronecker graph theory

3 Related works for large network analysis

4 INSERT PAPER - FMM for SKG

5 Discussion on generative model

What are the main takeaways from the generative model?

6 TODO

- convert couple scenes into large networks for examples - run inference experiments

Chapter 6

Deep Learning and Demo

Possible chapter

1 DNN problem formulations

- Bar code type of problem
- fly on object type of problem - Who am I?
- In painting
- Include IFRC data as metadata

Why not deep learning explored? Model importance for interpretability. Data constraints. Data feeding constraints.

2 Parallels to graph neural networks

refer to work from Talukdar tutorial

3 SORHACK Demo

Possible to include this chapter 4

3.1 Problem statement

- motivation
- resources
- hidden object estimation

success measurement. Precision Recall why not used? Refer papers - Sanne Elena

4 Further challenges

problems with object identification with integration to vision system.

5 TODO

- Report? arXiv paper on system integration?
- Make up the video

Chapter 7

Final Discussion

Discussion