

Indoor Human Tracking based on Dynamic Models from Convolutional Neural Networks

Master Thesis

by

Liangcheng Fu

Start date: 01 August 2017

End date: 30 January 2018

First Examiner: Prof. Alexander Schläfer

Second Examiner: Prof. Dr.-Ing. habil. Udo Zölzer

Supervisor: Johannes Döllinger

Contents

List of Figures	v
List of Tables	vii
1 Introduction	1
2 Literature Review	3
2.1 Literature Related to Neural Networks	3
2.2 Literature Related to Object Tracking	3
3 Background Knowledge	5
3.1 Bayesian Occupancy Filter (BOF)	5
3.1.1 Bayesian Filtering	5
3.1.2 Bayesian Occupancy Filter Formulation	5
3.2 Fully Convolutional Neural Network	5
3.2.1 Densely Connected Convolutional Networks (DenseNets)	5
3.2.2 Fully Convolutional DenseNets	5
3.3 Metrics	5
4 Implementation Details	7
4.1 Architecture of Neural Network	7
4.2 Implementation of BOFUM	7
4.3 Hyperparameter Tuning	7
5 Results	9
5.1 Overview of Datasets	9
5.1.1 Simulated Human Trajectory Dataset	9
5.1.2 Real Human Trajectory Dataset	9
5.2 Tracking on Simulated Data	9
5.3 Tracking on Real Data	9
6 Outlooks	11
6.1 End to End Training	11
6.2 Future Work	11

List of Figures

List of Tables

Chapter 1

Introduction

Chapter 2

Literature Review

2.1 Literature Related to Neural Networks

2.2 Literature Related to Object Tracking

Chapter 3

Background Knowledge

3.1 Bayesian Occupancy Filter (BOF)

3.1.1 Bayesian Filtering

3.1.2 Bayesian Occupancy Filter Formulation

3.2 Fully Convolutional Neural Network

3.2.1 Densely Connected Convolutional Networks (DenseNets)

3.2.2 Fully Convolutional DenseNets

3.3 Metrics

Chapter 4

Implementation Details

4.1 Architecture of Neural Network

4.2 Implementation of BOFUM

4.3 Hyperparameter Tuning

Chapter 5

Results

5.1 Overview of Datasets

5.1.1 Simulated Human Trajectory Dataset

5.1.2 Real Human Trajectory Dataset

5.2 Tracking on Simulated Data

5.3 Tracking on Real Data

Chapter 6

Outlooks

6.1 End to End Training

6.2 Future Work

