Alma Mater Studiorum - University of Bologna

Computer Science and Engineering - DISI

Artificial Intelligence

A study on tackling visual odometry by a transformer architecture

Master degree thesis

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Dedicato a nonna Giovanna e a tutte le persone che mi hanno aiutato a essere qui.

Summary

This dissertation describes a deepening study about Visual Odometry problem tackled with transformer architectures. The initial objectives were: create a synthetic dataset using BlenderProc2 framework, try different versions of transformer architectures which includes: ResNet feature extractor with encoder, ResNet feature extractor with encoder-decoder, ResNet feature extractor with encoder-decoder and pose Auto-encoder.

"Dio benedica quelle persone che quando incroci il loro sguardo per sbaglio, sorridono."

Thanks

Bologna, 06 October 2022 Xiaowei Wen

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Chapter 1

Introduction

In this section will be summarized the content of the whole thesis.

1.1 Background

1.2 Problem

1.3 Results

1.4 Thesis Organization

Chapter 2

Theoretical foundations

In this chapter will be presented the main theoretical knowledge useful to understand the content from successive chapters.

2.1 Deep Learning

2.2 Visual Odometry

Visual Odometry is an important task in robotics' computer vision field, because it allows the robot to understand where it is and how it is oriented.

Chapter 3

Datasets

In this chapter will be presented the datasets created and used for the visual odometry.

3.1 Kitti

3.2 Synthetic

Chapter 4

The State of the art

Chapter 5

Experiments

5.1 Encoder

5.2 Encoder-decoder

5.3 Encoder-Decoder with Auto-encoder

5.4 Prediction Strategies

Chapter 6

Implementations

Chapter 7

Final discussions

In this chapter will be discussed the results achieved.

7.1 Result Achieved

7.2 Knowledge Acquired

7.3 Future Developments

7.4 Personal Evaluation

Bibliopraphy

Bibliography references

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[2] *Owasp*. URL: https://owasp.org/www-project-mobile-top-10/.

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[3] Spyridon Samonas and David Coss. "THE CIA STRIKES BACK: REDEFINING CONFIDENTIALITY, INTEGRITY AND AVAILABILITY IN SECURITY." In: *Journal of Information System Security* 10.3 (2014).