Max Waterhout

Data scientist / machine learning engineer

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With a background in mechanical engineering, I pursued a Master's degree in Robotics, specializing in data science and artificial intelligence. Throughout my education, I have built a portfolio showcasing my expertise. I'm continually seeking opportunities to apply my knowledge and skills to projects that prioritize innovation and long-term growth. My goal is to continually expand my knowledge and expertise in AI and have complete knowledge of an efficient full machine learning pipeline (MLOps) and leveraging the cloud. A full overview of my professional path can be found at my website: **maxiew123.github.io/website_max_waterhout/**

Working Experience

Feb 2024 - present

AKOS (Engineering and consultancy firm), Apeldoorn – *Seconded*

From AKOS I was following the Young Development Program to drive professional and personal development. After a few months on the job, I recognized my passion for leveraging Artificial Intelligence to address diverse projects across multiple companies. Alternatively, I aspire to further my expertise by learning within an experienced data science team.

Apr 2024

Invaro Group, Hoorn – *Machine learning Engineer*

From working at Engineering & Consultant firm AKOS, I was positioned at Invaro Group in Hoorn with the role of machine learning engineer. In this role, I concentrated on creating new vision solutions for the flower and potato industry. My responsibilities included developing new deep-learning models, for example keypoint detection models and object detection. I consulted modernizing current models by implementing state-of-the-art training techniques to enhance script optimization. In this time I leveraged different tools like CVAT (annotation) and MLFlow, for efficient model and training versioning.

May 2023 - Feb 2024

Technical University of Delft, Delft – *Master thesis*

In my thesis, I developed a chess-playing robot using an RGB or RGB-Depth camera. The key aspect involved training a 6D pose estimation model through deep learning techniques, utilizing a custom synthetic dataset crafted from 3D scans of chess pieces. Furthermore, I created a validation dataset containing real-world data to assess the efficacy of my models to evaluate the Simulation to Reality gap. The thesis also carried out a comparative analysis of the results from 6D pose estimation models, differentiating between those based on RGB and RGB with depth refinement. Additionally, the research includes an evaluation of a robotic arm's picking capabilities on the small chess pieces utilizing the trained models. The complete thesis can be read at: [Evaluating 6D pose estimation accuracy with synthetic data | TU Delft Repositories](#)

September 2022 - October 2022

Police, Amsterdam – *Internship Data Scientist*

In my role at Team Efficiency Operational Information, I successfully designed and implemented a video classification system for analyzing seized videos. This system identifies and categorizes specific content, such as identifying videos related to guns or money laundering from vast collections of videos extracted from seized devices, including telephones with thousands of recordings.

June 2022 - September 2022

BIS publishers, Amsterdam – *Data analyst*

During my employment, I contributed to data analysis efforts, gaining valuable insights from incoming data. Notably, I played a role in enhancing stock management and predicting future book sales.

September 2019 - August 2020

Hörmann, Alkmaar – *Engineer R&D*

During my tenure, I actively participated in an R&D project team at Hörmann Alkmaar, with the primary objective of expanding and enhancing the product portfolio. My focus was mostly on a project where a blocking system for trucks was developed. My involvement spanned the entire research-to-prototype journey, encompassing diverse tasks such as CAD programming, FEM calculations, hands-on construction of prototypes, and effective communication with clients and colleagues. I am proud to highlight that in October 2022, the successful completion of this project resulted in the launch of the Radblockiersystem MWB2.

Education

September 2021 - February 2024

Technical University of Delft, Delft – Master Robotics

September 2020 - May 2021

Technical University of Delft, Delft – *Pre-Master Robotics*

September 2015 - May 2019

Hogeschool van Amsterdam, Amsterdam – *Mechanical Engineering (ED&I)*

September 2010 - May 2015

Jan van Egmond, Purmerend – *HAVO*

Relevant courses

- Machine learning
- Dynamics and Control
- Robot Software Practicals
- Machine perception
- Planning & Decision Making
- Deep-Learning
- Full-stack Deep Learning

- Computer vision by Deep learning
- Human & Robot Interaction
- Control in Human & Robot Interaction
- Safety sciences
- Object Oriented Scientific Programming with C++

Relevant certificates

- **Machine Learning Engineering for Production (MLOps) Specialization. DeepLearning.AI**
  Certificate of Completion: Verify Certificate
- **TensorFlow Developer Professional, DeepLearning.AI**
  Certificate of Completion: Verify Certificate
- **Data Science Professional Certificate,** *IBM*
  Certificate of completion: Verify Certificate

Relevant projects

Literature study

- This study investigates depth information affects 6D pose estimation using priori known objects at varying camera distances. The Linemod dataset was used to test the accuracy of three neural-network based models. based models, and results indicate that although depth can improve pose estimation accuracy, it cannot fully compensate for poorly predicted poses. The study also suggests several potential directions for future research, such as testing more algorithms and datasets, developing new metrics for measuring difficulty, and investigating the effects of depth enhancement in occluded scenarios. The literature review can be found here!

Reproducing the paper: Time-Contrastive Networks: Self-Supervised Learning from Video

- Reproducing the paper titled 'Time-Contrastive Networks: Self-Supervised Learning from Video' as part of the Seminar on Computer Vision by Deep Learning course at the Technical University of Delft. In the field of computer vision, deep neural networks excel in tasks with clear human-labeled data, like object detection. However, challenges arise in labeling complex tasks, such as in robotics, like pouring. This paper aimed to teach robots to understand pouring tasks solely through observation. The method involves training a network to learn essential features like pose and liquid volume while being unaffected by different viewpoints and settings. This method uses supervised and representation learning. A blog and code can be found here and covers motivation, implementation, achieved results, and limitations.

Reproducing the paper: Robust Visual SLAM Across Seasons

- Reproducing the paper titled 'Robust Visual SLAM Across Seasons' as part of Deep Learning course at the Technical University of Delft. This paper introduces a visual SLAM method that spots loop closures across seasons by analyzing image sequences. Using a deep convolutional neural network, it extracts descriptors from each image in the sequences. Then, it creates a similarity matrix by comparing images from one sequence to those from another. This helps in identifying matching patterns, even with partially similar routes or varying robot speeds. By leveraging this information, it formulates a graph-based SLAM problem to calculate the most likely trajectory. A blog of this work can be found here and covers motivation, implementation, achieved results, and limitations.

Machine failure prediction

- The objective of this project was to forecast machine failures in production. It involved various aspects of machine learning, including data exploration, training, validation, and result analysis. You can access the code for this project here.

Forecasting competition hosted on Kaggle

- To improve my forecasting I participated in a forecasting competition on Kaggle. With Kaggle I am also learning from other participants. The GitHub repo can be found here

Created a semantic search prototype app

- For an idea I had, I wanted to do a semantic search for the YouTube videos of 3BlueBrown . This script

is a really quick and easy prototype that searches in the whole youtube channel and matches user questions with videos! The app is launched within the Streamlit cloud and the full GitHub repo can be found [here](#)

Creating a website

- I have put my portfolio on a website which is created with a free bootstrap template that can be found [here](#).

Relevant skills

- **Languages:** Dutch (native), English (fluently)
- **Programming languages**: Python, C++ , Excel
- **Data Science:** MLOps, Docker, Streamlit, PyTorch, Git, Github, TensorFlow, Computer vision (Classification, Object detection, openCV, Keypoint detection), Natural Language Processing (NLP), Forecasting, Pandas, Linux, OpenCV, PowerBI, MLFlow, EDA, image annotation
- **CAD:** CREO, Solidworks, Finite element methods (FEM)
- **Robotics**: Robot Operating System (ROS), Gazebo
- **Proptotyping:** CNC Machining, Milling, Lathe, 3D printing, VOL-VCA