

# Coen van den Elsen

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## Experience

### OceanOS

Jan 2025 – Present

Machine Learning Intern

London, UK

- Developed a marine foundation model using geospatial data to support oceanic intelligence and marine conservation.
- Created a geospatial pretraining dataset by preprocessing Xarray datasets from NetCDF/Zarr files.
- Designed a model architecture capable of handling 3D spatiotemporal marine data and land-ocean semantics.
- Built a pretraining pipeline with Dockerized multi-GPU training on cloud platforms, including:
  - Failsafes such as unit tests and automatic cloud uploads during and after runs
  - Environmental monitoring using CodeCarbon
- Optimized the training pipeline to be  $35\times$  faster without performance loss.
- Developed forecasting model as part of end-to-end marine data analysis.

### University of Amsterdam

Sep 2020 – Jan 2025

Teaching Assistant, FNWI

Amsterdam, Netherlands

- Led tutorials for 30 first- and second-year students.
- Supported instruction in multiple courses, including:
  - Programming (various)
  - Linear Algebra
  - Calculus and Optimisation
  - Information Visualization
  - Study orientation and career

### University of Amsterdam

Sep 2021 – Jul 2022

Mentor

Amsterdam, Netherlands

- Mentored a group of 30 second-year students, providing academic and peer support.

## Education

### University of Amsterdam

Sept 2023 – Present

MSc Major Artificial Intelligence

Amsterdam, Netherlands

- GPA: 8.1 (as of 8 May 2025)

### University of Cape Town

Jul 2022 – Dec 2022

Exchange Program

Cape Town, South Africa

- **Courses:** Marine Resources and Geography, Development and Sustainability

### University of Amsterdam

Sept 2019 – Jul 2023

BSc Natural and Social Sciences — Specialization in Artificial Intelligence

Amsterdam, Netherlands

- Honors Program
- GPA: 8.02 / 10

## Skills

**Programming** Python, R  
**ML Frameworks** PyTorch, Lightning CLI, Scikit-learn  
**Data Tools** Xarray, Numpy, Pandas, SciPy  
**Cloud** AWS, DigitalOcean  
**Docker** Multistage builds, UV optimization

**MLOps** W&B, profiling, CodeCarbon  
**Mathematics** Linear Algebra, Calculus, Logic, Probability, Statistics  
**Streaming/Storage** Optimized cloud-based data access and I/O: (Zarr, memory-efficient pipelines, streaming)

## Languages

- **Dutch** Native
- **English** Fluent (CEFR C1)

### **Reproducing NevIR: Negation in Neural Information Retrieval**

*University of Amsterdam — SIGIR Publication*

**2025**  
*Amsterdam, Netherlands*

- Published at SIGIR 2025.
- Replicated and extended NevIR to assess IR models' handling of negation.
- Found only cross-encoders and listwise LLM re-rankers achieved moderate performance—still below human level.
- Showed poor generalization when fine-tuning across negation datasets.

### **Geometric Algebra Simplicial Transformer**

*University of Amsterdam — Deep Learning 2 Project*

**2023**  
*Amsterdam, Netherlands*

- Proposed a novel class of equivariant transformers.
- Leveraged simplicial complexes and Clifford algebra to capture full symmetry group equivariance.

### **Predicting Perceived Attributes of Urban Images**

*University of Amsterdam — Bachelor Thesis*

**2022**  
*Amsterdam, Netherlands*

- Investigated the use of GIST features to cluster Amsterdam street scenes.
- Explored how well these clusters capture perceived attributes of urban environments.

### **Robustness Against Label Noise in Road Defect Severity Estimation**

*University of Amsterdam — Learning and Deciding Project*

**2021**  
*Amsterdam, Netherlands*

- Researched CNN-based road defect severity estimation and classification.
- Studied impact of label noise and proposed robustness strategies.