Olav Forland

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Education

Harvard University | *SM, Data Science* Sep 2024 -

Thesis on hardware-acceleration of transformers using Systolic Arrays under Prof. H.T. Kung
Relevant Coursework: CS161: Operating Systems, CS165: Data Systems, CS242: Computing at Scale, CS263: Systems Security, AM220: Geometric Machine Learning, AM215: Mathematical Modeling, AM207: Advanced Scientific Computing

NTNU | *Integrated M.Sc. in CS and Operations Research* Aug 2019 - May 2024

Thesis developed a novel Dantzig-Wolfe decomposition and Branch & Price approach solving the production planning problem in land-based salmon farming under Prof. Henrik Andersson in collaboration with industry partners Solution Seeker and Salmon Evolution.
Relevant Coursework: Machine Learning, Statistics, Parallel Programming, Optimization Methods, Large-Scale Optimization

Research Experience

Harvard University | *Computer Science Lab (Prof. H.T. Kung)* Jan 2025 -

Working on hardware acceleration of transformers using Systolic Arrays.

- Design of systolic array based hardware that allows for exact and efficient attention computation in transformers.
- Hardware implementation and benchmarking using Verilog and C++.

Harvard University | *Material Research Intelligence Lab (Prof. Boris Kozinsky)* Jun 2025 - Sep 2025

Worked on NequIP Foundation Models, a project scaling the NequIP equivariant neural network for interatomic potentials to large, heterogeneous materials datasets.

- Implemented data sharding, memory-aware PyTorch samplers for load balancing, and distributed datasets in an open-source extension package to NequIP.
- Trained and evaluated models on the National Energy Research Scientific Computing Center's (NERSC) cluster *Perlmutter*.
- Performed profiling, performance optimization, and model acceleration for multi-GPU training.

Harvard University | *AM220: Graph Machine Learning Project* Jan 2025 - May 2025

Adapted the NequIP E(3)-equivariant architecture to a 2D E(2)-equivariant GNN for the Traveling Salesman Problem, improving data efficiency and reducing optimality gap by up to 25%. Showed via t-SNE that the model clusters geometrically equivalent tours together.

Norwegian University of Science and Technology | *Master Thesis (Prof. Henrik Andersson)* Aug 2023 - May 2024

Researched and developed one of the first applications of a Dantzig–Wolfe decomposition and Branch & Price algorithm in land-based salmon farming, improving capacity utilization (84%→91%), harvest weight (5.4→5.9 kg), and profits (up to +60%) for Salmon Evolution.

- Modeled industry partner Salmon Evolution's salmon production planning problem as a mixed integer linear optimization model in Python using Gurobi, capturing deployment, transfer, sorting, and harvest of fish for their current and planned facilities.
- Applied Dantzig–Wolfe decomposition with column generation, and implemented a Branch & Price algorithm to enforce integrality; achieved sub-linear scaling in the number of tanks and linear scaling in the number of planning periods.
- Built a scalable Python optimization framework supporting decision-making in smolt ordering, deployment, and harvest planning.

Professional Experience

Alv AS | *Software Engineer Intern* Jun 2023 - Aug 2023

Developed a recommendation application for outdoor activities and a machine learning pipeline predicting the impact of weather on hiking and skiing conditions.

- Designed and built a cross-platform front-end application using Flutter, with a C# / .NET backend using MongoDB.
- Led the end-to-end development, training, evaluation, and deployment of a PyTorch machine learning model that ingests real-time weather data and predicts hiking and skiing conditions across Norway.

Plaace AS | *Data Science Intern* Jun 2022 - Aug 2022

Set up data pipelines that analyzed large volumes of real-time data to extract trends in urban commercial activity.

- Engineered high-performance analytics scripts in Python using Pandas, integrated with Google BigQuery and SQL, to process millions of nationwide retail and service industry records efficiently.
- Enabled hierarchical, on-demand drill-down analysis by both industry and geographic region, delivering real-time, interactive access to detailed commercial activity metrics across Norway at any user-chosen granularity.

Achievements & Awards

Aker Scholarship | *Norwegian Top Talent Educational Grant Program* 2023

Full Scholarship, covering tuition and living costs, for graduate studies at Harvard. ~20 candidates are chosen each year through an application and 4 interviews with top Norwegian academics and a psychologist. The only scholarship of the sort in Norway.