

Arnold Kalmbach

Senior Data Scientist

*Expert in machine learning, computer vision, and signal processing algorithms.
Experienced in all stages of data science development, from exploratory analysis to deployment.
Specialist in the scientific python stack.*

Email: akalmbach@gmail.com | Web: arnoldkalmbach.github.io | Phone: 250-885-8155

Languages & Skills

Scientific Python	pytorch/tensorflow, huggingface, numpy, scipy, scikit-learn, pandas / polars etc
Efficient Inference	ONNX, TensorRT, Triton Server, Optimum
Geospatial Data Science	gdal, geopandas, PostGIS, QGIS

Professional Experience

Senior Data Scientist — Kinsol Research Inc.

Jul 2022 -
Present

Team lead for multiple client projects – Managed day to day relationships with clients and led small teams of 1-3 junior data scientists and developers from Kinsol.
Helped startups operationalize the best ML/AI models for their needs.
Provided analysis and integration of ML/AI models, while guiding client product teams to deliver features aligned with business needs and technical feasibility.

Key Projects:

Implemented sensitive content detection for Instagram post captions. Iterated research, implementation, and problem definition together with the product team. Delivered a model that can detect >1500 very fine grained sensitive topics, with higher accuracy than GPT-4 on our test data.

Oversaw the data science plan and contributed to tools that build an inventory of all electrical substations in the USA. The tools use a combination of existing databases and a custom fine-tuned computer vision model applied to satellite data. Scaled the ML pipeline to perform inference on high-res satellite data from millions of candidate points, covering 100 metro areas in the USA.

Oversaw the data science plan and integrated machine learning solutions on a project to detect clinically significant events in microphone and PPG data on a wearable medical device. Kept data science (Kinsol), and clinical, DSP (client) teams in sync.

Data Scientist — Kinsol Research Inc.

May 2017 -
Jul 2022

Implemented machine learning, computer vision, and signal processing algorithms for a broad range of client projects.

Provided value to clients by filling gaps from science to production; As scientist performing literature review and implementing rapid prototypes; As machine learning expert generalizing existing hand-tuned models based on data; As engineer optimizing and productionizing models too dense for engineering teams.

Communicated with clients several times per week, delivering quantitative progress reports and coordinating development plans to meet business milestones.

Key Projects:

Productionized an existing flood model, reducing runtime 2x from hydrologists' original version, facilitating scaling of the model from city to national level.

Applied black-box optimization techniques to tune real-time vocal pitch detection algorithm parameters, leading to best-in-class pitch detection accuracy.

Implemented specialized signal processing algorithms for motion tolerant heartbeat detection.

Automated Video Analysis Intern — Ocean Networks Canada

Jun -
Nov 2015

Implemented an algorithm to automatically produce sea-floor classification maps from dive-log videos (Kalmbach, WACV 2016 in Publications below).
Implemented and deployed algorithms for automated quality control of live deep-sea video from a network of underwater observatories.

Test Technician & Autonomy Software Co-Op — Clearpath Robotics Inc.

Jan -
May 2015
(Contract)

Developed CI for robot autonomy behaviors such as localization, mapping, and path following using Gazebo (robot simulation environment).
Deployed ROS tools for a robot with an integrated industrial arm, including arm control through the CAN protocol and integration with high level planning through MoveIt, MoveBase and Gazebo.

May -
Aug 2014
(Co-Op)

Education

McGill University — MSc. Computer Science

Jan 2016 -
Sep 2018

Thesis - *Unsupervised Learning of Interpretable Models for Sparse, Smooth Data* (Sep. 2018).
Contributed a variety of Bayesian non-parametric methods to learn temporally varying semantic maps.
Significant work on machine learning, computer vision, and algorithmic robotics problems as well as robot deployments and field experiments.
Coursework focus on the fundamentals of machine learning, computer vision, digital signal processing, and optimization.
Supervisor Greg Dudek, Mobile Robotics Lab

McGill University — BSc. Comp. Sci.

Sep 2009 -
May 2013

Emphasis on mathematical foundations of Comp. Sci.
Began involvement with robotics research, Mobile Robotics Lab (2012).

Honors and Awards

2nd place, Student Poster Competition, MTS Oceans 2017
2017 ICRA IEEE RAS Travel Grant Recipient
Guest Student Appointment, Summer 2016, Woods Hole Oceanographic Institution
3rd place, McGill CS Undergraduate Research Symposium 2012

Selected Publications & Research Experience

Learning Seasonal Phytoplankton Communities with Topic Models.

**MTS OCEANS
2017**

A Kalmbach, H M Sosik, G Dudek, and Y Girdhar

Phytoplankton Hotspot Prediction with an Unsupervised Spatial Community Model.

ICRA 2017

A Kalmbach, Y Girdhar, H M Sosik and G Dudek.

Learning Deep-Sea Substrate Types with Visual Topic Models.

WACV 2016

A Kalmbach, M Hoeberechts and A Branzan Albu

Unsupervised environment recognition and modeling using sound sensing. A

ICRA 2013

Kalmbach, Y Girdhar, and G Dudek