



## Databases, DNA & Digital Detours

From Smart Algorithms in Fish Portioning to Pioneering Pipelines in Long-Range DNA Sequencing and Digital Travel

Dr. Helga Ingimundardóttir <helgaingim@hi.is>

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INDUSTRIAL ENGINEERING

Personal Introduction

Academic Background

Research Highlights

Professional Experiences

Teaching Philosophy

Looking Ahead

## Academic Evolution:

- ▶ Started with math; transitioned to comp. science and applied math.
- ▶ Master's in Computational Engineering cemented my direction.

## Into the Academic Realm:

- ▶ Began as TPR's TA, grew into PhD and *much* later, Post-Doc roles.
- ▶ Returned to teaching after a decade; found confidence in maturity.

## Merging Industry & Academia:

- ▶ Tapped into industry insights: software dev., AI, and data science.

## Passions Beyond Academia:

- ▶ Textile enthusiast: garment sewing, knitting, lace making, machine embroidery.
- ▶ A recent aficionado of modern board games.

- ▶ **B.Sc. in Mathematics** (Emphasis on Computer Science), University of Iceland, 2005-2008.
- ▶ **M.Sc. in Computational Engineering**, University of Iceland, 2008-2010:
  - ▶ Erasmus exchange at Université de Valenciennes.
  - ▶ Focus: fouling in cross-flow heat exchangers with Prof. Sylvain Lalot
- ▶ **Ph.D. in Computational Engineering**, University of Iceland:
  - ▶ PhD Stipend from autumn 2009-2012
  - ▶ Started working full-time at Valka Jan 2013, PhD in spare time.
  - ▶ Defended in June 2016
- ▶ **Diploma in Teaching Studies for Higher Education**, 2010-2012.
  - ▶ Taught Operations Research 2011 and 2012

- ▶ Case Study on supervised learning approaches in dispatching rules for **Job Shop Scheduling Problem** (JSSP).
- ▶ Introduction of **Analysis & Learning Iterative Consecutive Executions** (ALICE) framework for effective training.
- ▶ Emphasized Training Data:
  - ▶ Should match the induced data distribution via active imitation learning.
  - ▶ Labels are derived using an expert policy.
  - ▶ Account for data balance with respect to dispatching step.
  - ▶ Use of  $(K - k)$  roll-outs to augment stepwise features.
- ▶ Expert policy not just for labeling; also reveals vulnerabilities in the scheduling process.
- ▶ While stepwise optimality often aligns with good end performance, there's room for understanding trajectory deviations.
- ▶ Approach leverages preference learning but is flexible for substitutions and other scheduling problems.

## Ph.D. Research

- ▶ Helga Ingimundardottir and Thomas Philip Runarsson (Nov. 2011). “Sampling Strategies in Ordinal Regression for Surrogate Assisted Evolutionary Optimization”. In: **Intelligent Systems Design and Applications (ISDA), 11th International Conference on**. Cordoba, Spain, pp. 1158–1163
- ▶ Helga Ingimundardottir and Thomas Philip Runarsson (Aug. 2018). “Discovering dispatching rules from data using imitation learning: A case study for the job-shop problem”. In: **Journal of Scheduling** 21.4, pp. 413–428
- ▶ Helga Ingimundardottir and Thomas Philip Runarsson (2015). “Generating Training Data for Supervised Learning Linear Composite Dispatch Rules for Scheduling”. In: **Learning and Intelligent Optimization**. Vol. 8994. *Lecture Notes in Computer Science*. Cham: Springer, pp. 236–248 (Nominated for Best Paper Award at LION 2015)

## Master's Research

- ▶ Helga Ingimundardottir and Sylvain Lalot (2011). “Detection of Fouling in a Cross-Flow Heat Exchanger Using Wavelets”. In: **Heat Transfer Engineering** 32.3-4, pp. 349–357

## deCODE genetics Research

- ▶ Doruk Beyter et al. (June 2021). “Long-read sequencing of 3,622 Icelanders provides insight into the role of structural variants in human diseases and other traits”. In: **Nature Genetics** 53, pp. 779–786
- ▶ Guillaume Holley et al. (Jan. 2021). “Ratatosk: hybrid error correction of long reads enables accurate variant calling and assembly”. In: **Genome Biology** 22.1, p. 28

- ▶ **deCODE genetics** (2016-2020):
  - ▶ Designed and managed the **ONT** long-range sequencing analysis pipeline.
  - ▶ Key role in handling 6 petabytes of data.
  - ▶ Contributed to significant research projects.
- ▶ **Valka** (2013-2015):
  - ▶ Developed fish bone detection algorithms.
  - ▶ Implemented fish portioning algorithms for multiple species.
- ▶ **AGR Dynamics**: SQL consultant for supply chain management system, AGR 5.
- ▶ **CCP Games**: Developed near-realtime recommendation engine for new EVE Online players.
- ▶ **Travelshift** (Head of AI Research): Led AI consultancy team optimizing travel plans on [GuideToEurope.com](https://www.guideto-europe.com).
- ▶ Advisor for **RANNÍS** Technology Development Fund 2015 & 2023.

- ▶ **Real-World Relevance:** Connecting classroom lessons with real-world applications, emphasizing the power of teamwork in solving modern challenges.
- ▶ **Technical Writing:** Emphasizing the importance of clear, concise communication. Teaching students the art of turning data and results into compelling narratives.
- ▶ **Data Storytelling:** Equipping students with tools and techniques for effective data visualization. Encouraging the creation of visual narratives from raw data.
- ▶ **Open Collaboration with GitHub:**
  - ▶ Highlighting GitHub as an essential workforce skill.
  - ▶ Using it for team assignments, fostering practical hands-on experience.



## Current Endeavors:

- ▶ Active contribution to **IDeLM**.
- ▶ Collaborative work with TPR on the fairness model.

## Future Aspirations:

- ▶ Carve a niche at the crossroads of AI and creativity.
- ▶ Dive into garment pattern optimization using 2D free-form binpacking.
- ▶ Utilize generative AI for an innovative knitting program.

Always open for collaboration, brainstorming, and discussions.

- ▶ **E-mail:** [helgaingim@hi.is](mailto:helgaingim@hi.is)
- ▶ **Temporary Office:** Squatting in TPR's office. Feel free to drop by for discussions!