Christian Bean

Postdoctoral Researcher

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Work experience

Postdoctoral researcher — *Reykjavík, Iceland*

Reykjavík University — *Jul. 2018 - Jul. 2019*

Education

Reykjavík University — *Reykjavík, Iceland*

PhD in Computer Science — *Aug. 2014 - Jun. 2018*

- Supervisor: Prof Henning Ulfarsson
- Thesis: "Finding structure in sets of permutations" - *The main goal is to develop an algorithm which will aid researchers in finding structures in sets of permutations and use those structures to find generating functions to enumerate the set. My assignment is primarily the development of the theory of permutation patterns relating to the new algorithm as well as implementation of the algorithm.*

Universtiy of St Andrews — *St Andrews, Scotland*

MMath (Hons) in Mathematics (1st Class) — *Sep. 2010 - Jun. 2014*

- Project Supervisor: Dr Martyn Quick
- Dissertation: "Powerful p-Groups"

Publications

Automatic discovery of structural rules of permutation classes — *Mathematics of Computation*

Joint work with B. Gudmundsson, H. Ulfarsson — *2018*

- https://arxiv.org/abs/1705.04109

Simultaneous avoidance of a vincular and a covincular pattern of length 3 — *Journal of Integer Sequences*

Joint work with A. Claesson and H. Ulfarsson — *2017*

- http://arxiv.org/abs/1512.03226

Cognitive workload classification using cardiovascular measures and dynamic features — *IEEE 8th International Conference on Cognitive Infocommunications*

Joint work with E. H. Magnusdottir, K R. Johannsdottir, B. Olafsson and J. Gudnason — *2017*

- https://tinyurl.com/y8gnnuhc

Pre-prints:

Pattern avoiding permutations and independent sets in graphs — *Journal of Combinatorics*

Joint work with M. Tannock and H. Ulfarsson — *To appear in 2019*

- http://arxiv.org/abs/1512.08155

In preparation:

Combinatorial Exploration: An algorithmic framework for enumeration

Joint work with M. Albert, A. Claesson, J. Pantone, and H. Ulfarsson

- https://permutatriangle.github.io/papers/2019-02-27-combex.html

Algorithmic coincidence classification of mesh patterns

Joint work with B. Gudmundsson, T. Magnusson, and H. Ulfarsson

- https://permutatriangle.github.io/papers/2019-03-03-shalg.html

Pattern avoiding Motzkin paths are algebraic

Joint work with K. Erlingsson, B. Gunnarsson, K. Jonsson, and H. Ulfarsson

Enumerating permutation classes by inflating independent sets of graphs

Joint work with E. Nadeau, and H. Ulfarsson

Software packages

permuta, A Python library for working with perms (short for permutations), patterns, and mesh patterns, https://pypi.org/project/permuta/ — *2019*

comb_spec_searcher, A Python library for performing combinatorial exploration, https://pypi.org/project/comb-spec-searcher/ — *2019*

In preparation:

grids, A Python library for working with gridded permutations and tilings, this package builds on permuta

tilescope, A Python library for combinatorial exploration of permutation classes, this package builds on grids and comb_spec_searcher

motzkinscope, A Python library for enumerating pattern avoiding Motzkin paths, this package builds on comb_spec_searcher

Presentations and conferences

Invited:

Permutation Patterns, June 2019, gave lecture series *"Automatic methods for enumerating permutation classes"* at the pre-conference workshop — *Zurich, Switzerland*

Other:

ICE-TCS Theory Day, August 2018, presented *"Combinatorial exploration"* — *Reykjavik, Iceland*

Algorithmic and Enumerative Combinatorics Summer School 2018, July 2018, presented *"Combinatorial exploration"* — *Hagenberg, Austria*

Permutation Patterns, July 2018, presented *"Combinatorial exploration of permutation classes"* — *Dartmouth, USA*

British Combinatorial Conference, July 2017, presented *"Creating a virtual combinatorist"* — *Glasgow, Scotland*

Permutation Patterns, June 2017, presented *"Automatic enumeration of restricted permutations"* — *Reykjavík, Iceland*

ICE-TCS Seminar, April 2017, presented *"Creating a virtual combinatorist"* — *Reykjavík, Iceland*

Young Researchers in Mathematics, August 2016, presented *"Struct: Finding structure in permutation sets"* — *St Andrews, Scotland*

Permutation Patterns, June 2016, presented *"Struct: Finding structure in permutation sets"* — *Washington, D.C, USA*

ICE-TCS Seminar, May 2016, presented *"Struct: Finding structure in permutation sets"* — *Reykjavík, Iceland*

Scottish Combinatorics Meeting, April 2016, presented *"Struct: Finding structure in permutation sets"* — *Glasgow, Scotland*

British Combinatorial Conference, July 2015, presented *"Avoiding a pair of vincular and covincular patterns"* — *Warwick, England*

Permutation Patterns, June 2015, presented *"Avoiding a pair of vincular and covincular patterns"* — *London, England*

Postgraduate Combinatorial Conference, April 2015, presented *"Avoiding a pair of vincular and covincular patterns"* — *London, England*

ICE-TCS Seminar, February 2015, presented *"Avoiding a pair of vincular and covincular patterns"* — *Reykjavík, Iceland*

Joint Mathematics Meeting, January 2015, presented by Prof H. Ulfarsson *"Struct: An algorithm for guessing the structure and enumeration of permutation sets"* — *San Antonio, TX, USA*

Teaching experience

Lecturer for:

Discrete Mathematics II (T-419-STR2) — *Reykjavík University, Iceland*

This course was for B.Sc. students in computer science — *Spring, 2018*

Programming (T-111-PROG) — *Reykjavík University, Iceland*

This course was for B.Sc. students in computer science — *Fall, 2018*

Cryptography and Number Theory (T-513-CRNU) — *Reykjavík University, Iceland*

This course was for B.Sc. students in discrete mathematics and computer science — *Fall, 2016, 2017, and 2018*

Algebra and Combinatorics (T-218-ALCO) — *Reykjavík University, Iceland*

This course was for B.Sc. students in discrete mathematics and computer science — *Spring, 2018*

Game Theory (E-409-LEIK) *Reykjavík University, Iceland*

This course was for B.Sc. students in discrete mathematics and computer science *Spring, 2017*

Teaching assistant for:

Algebra and Combinatorics (T-218-ALCO) *Reykjavík University, Iceland*

This course was for B.Sc. students in discrete mathematics and computer science *Spring, 2015, and 2016*

Cryptography and Number Theory (T-513-CRNU) *Reykjavík University, Iceland*

This course was for B.Sc. students in discrete mathematics and computer science *Fall, 2015*

Skills

Programming Python, LaTeX, Java, C++, Matlab, Maple

Languages English (native), French (basic), Icelandic (basic)

Other duties

Supervising

- Aiding with the supervision of five MSc students Ragnar Árdal, Arnar Bjarni Arnarson, Bjarni Jens Kristinsson, Tomas Ken Magnússon and Unnar Freyr Erlendsson on their projects related to permutation patterns.
- Supervisor for BSc project "*Identifying structure in Motzkin paths*" by Björn Gunnarsson, Kolbeinn Erlingsson and Kristmundur Jónsson (2018).
- Supervisor for BSc project "*Identifying structures in set partitions*" by James Robb and Sigurður Helgason (2018).
- Co-supervisor for BSc project "*Implementation of a planarity testing method using PQ-Trees*" by Alex William Cregten and Hannes Kristján Hannesson (2017).
- Co-supervisor for BSc project "*PermPAL - Permutation Pattern Avoidance Library*" by Arnar Bjarni Arnarson, Álfur Birkir Bjarnason, Sigurjón Freyr Viktorsson, and Unnar Freyr Erlendsson (2017).
- Co-supervisor for BSc project "*Generalized star polygons and star polygrams*" by Eiður Sveinn Gunnarsson and Karl Þorlákssson (2016).

Organisation of conferences:

- I was a member of the organising committee for Permutation Patterns 2017 held at Reykjavik University. (https://pp2017.github.io)

Review:

- MathSciNet