Catalina V. Anghel

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Profile

Data scientist with experience and interest in applying mathematics and machine learning methods (in particular deep learning) to complex problems

Academic Summary

Postdoctoral Researcher **2016 - 2017**
University of California, Davis, Genome Center, Davis, CA
Advisor: Prof. Gerald Quon

Postdoctoral Researcher **2013 - 2015**
Ontario Institute for Cancer Research, Toronto, ON
Advisor: Prof. Paul C. Boutros

Ph.D. in Mathematics **2007 - 2013**
University of Toronto, Toronto, ON
Thesis: *The self-power map and its image modulo a prime*
Advisor: Prof. V. Kumar Murty

M.S. in Mathematics **2005 - 2007**
ALGANT Erasmus Mundus Master
University of Bordeaux, France and University of Padova, Italy

B.S. Honours Applied Mathematics **2000 - 2005**
McGill University, Montreal, QC

Publications

Anghel C., Archer K., Chang, J.M., Cochran A., Radulescu, A., Djima K., Salafia C.M., Turner R., Zhong L. *Placental vessel extraction with shearlets, Laplacian eigenmaps, and a conditional generative adversarial network.* Understanding Complex Biological Systems with Mathematics, Springer Proceedings in Mathematics & Statistics (Submitted)

Anghel C., Archer K., Chang, J.M., Cochran A., Radulescu, A., Djima K., Salafia C.M., Turner R., Zhong L. *Simulations of the vascular network growth process for studying placenta structure and function associated with autism.* Understanding Complex Biological Systems with Mathematics, Springer Proceedings in Mathematics & Statistics (Submitted)

Allen G.I., Amoroso N., **Anghel C.**, Balagurusamy V., *et al.* *Crowdsourced estimation of cognitive decline and resilience in Alzheimer's disease.* Alzheimer's and Dementia. (2016) 12(6) 645-53.

Anghel C., Quon G., Haider S., Nguyen F., Deshwar A.G., Morris Q.D., Boutros P.C. *ISOpureR: an R implementation of a computational purification algorithm of mixed tumour profiles.* BMC Bioinformatics. (2015) 16:156.

Anghel C. *The self power map and collecting all residue classes.* Mathematics of Computation. (2016) 85:379-399

Govind S.K., Zia A., Hennings-Yeomans P.H., Watson J.D., Fraser M., **Anghel C.**, Wyatt A.W., Van der Kwast T., Collins C.C., McPherson J.D., Bristow R.G., and Boutros P.C. *ShatterProof: operational detection and quantification of chromothripsis.* BMC Bioinformatics. (2014) 15:78

Alzalg B., **Anghel C.**, Gan W., Huang Q., Rahman M., Shum A., Wu C.W. *Contingency constrained optimal power flow solutions in complex network power grids.* ISCAS (2012) 1636-1639.

Anghel C., Margrave G., Nigam N. *Locating anomalous seismic attenuation: A mathematical investigation.* Canadian Applied Math Quarterly. (2004) 12(4): 439-476.

Sun Z., **Anghel C.**, Tatibouet J. *Application of Ultrasound and Neural Networks in the Determination of Filler Concentration and Dispersion During Polymer Extrusion Processes.* Annual Technical Conference for the Plastics Industry. (2003)

Conferences and Talks

December 2017: Women in Machine Learning and Conference on Neural Information Processing Systems, Long Beach, CA.

- Poster: *Using a conditional adversarial network for placental blood vessel segmentation*.

April 2017: Women Advancing Mathematical Biology: Understanding Complex Biological Systems Using Mathematics, Mathematical Biosciences Institute, Columbus, OH

March 2017: San Diego Supercomputer Center Workshop, Davis CA

July 2016: Computational Genomics Summer Institute Short Course, University of California, Los Angeles, CA.

July 2015: GANITA Lab Seminar, University of Toronto Mathematics Department, Toronto, ON.

- Presentation: *Gibbs sampling for Dirichlet Processes.*

May 2015: The Terry Fox Research Institute 6th Annual Scientific Meeting, St. John's, NL.

- Poster: *Deconvolving transcriptional signatures of hypoxia, stroma and tumour aggressivity*.

April 2015: Hypoxia General Meeting, University Health Network, Toronto, ON.

- Presentation: *Towards computational deconvolution of mRNA abundance profiles related to microenvironment*.

May 2014: The Terry Fox Research Institute 5th Annual Scientific Meeting, Montreal, QC.

- Poster: *Computational purification of tumour mRNA abundance profiles*.

May 2014: Informatics for Cancer Genomics, Canadian Bioinformatics Workshops, Toronto ON.

March 2014: Workshop in Mathematical Oncology V. Fields Institute, Toronto, ON.

Technical Skills

Machine Learning: Neural networks/deep learning; standard algorithms such as random forests, support vector machines

Programming Languages: R (advanced), MATLAB and Torch (intermediate), Python and PyTorch (beginner)

Data processing: Genomics (microarray and RNA-Seq expression profiles, SNP), imaging, time series

High Performance Computing: SLURM, Amazon Web Services Cloud

Teaching

Volunteer Instructor
Data and Software Carpentry

Taught basic lab skills such as Unix shell, git, cloud computing, and basic programming for data-driven research to students and researchers

- Data Carpentry Genomics, St. Louis, MO — June 17, 2017
- Data Carpentry Genomics, Stanford University, CA — January 22-23, 2017
- Software Carpentry, University of Ontario, Oshawa, ON — January 8-9, 2015

Teaching Assistant **May 20-22, 2015**
Canadian Bioinformatics Workshops, Toronto, ON

- "Introduction to R" & "Exploratory Analysis of Biological Data using R" helper
- Highest rated instructor in both workshops

Course Instructor and Teaching Assistant **2007 - 2013**
University of Toronto, Toronto, ON

- Taught in an active-learning style, developed activities such as problem-solving sessions, coordinated TAs, and prepared quizzes and tests as a sole and co-responsible course instructor for calculus and linear algebra
- Led weekly tutorial sessions for courses ranging from vector calculus to number theory to classical geometries
- Daniel B. DeLury Teaching Award, 2012

Service

University of Toronto Mentor, Toronto ON **2014 - present**
Provided career and academic guidance and encouragement to undergraduate students in mathematics, during bi-weekly meetings

GANITA Conference Organizer, Toronto, ON **Spring 2016**