Jānis Lazovskis

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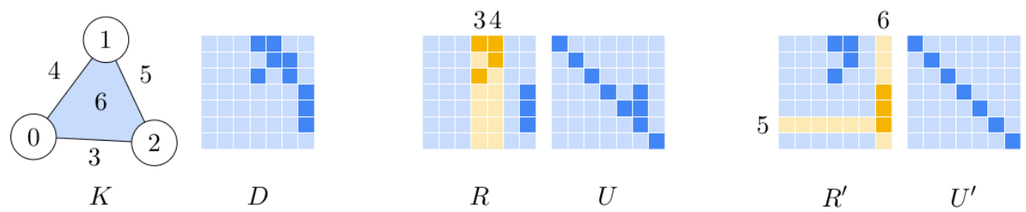
About me

Postdoctoral researcher at the University of Latvia, working in applied and computational topology. I've worked as a postdoc at the University of Aberdeen in the neuro-topology group of Ran Levi, and I did my PhD at the University of Illinois at Chicago, co-advised by Ben Antieau and Shmuel Weinberger.

Math

I work in: Computational topology, persistent homology, class representatives in dynamic situations, biological applications



Background: Graph theory, combinatorics, algebra via category theory

I like math that is: Visually pleasing, descriptive, without "obviously"

What I think about when I think about...

Language: Python, but I'm enjoying C++

Color: Light pastels, gradients, halftones

Books: I started reading a book this year for the first time in many years

Sports: Biking. I used to run. I like to swim

Cultural identity: Latvia, the physical land. Singing in choirs

LaTeX: Live it, love it, I do all my darwings in TikZ

Music: Sets the mood, blasting through my skull

Relaxing: Hiking in the mountains, though not too high

Making posters: Annoying, but I get it. I wish Adobe Illustrator and LaTeX had a child so it would be easier

How I got here

5 years PhD → 1 year postdoc → 3 years teaching and admin → 1 year industry → 3 years postdoc

UIC UNIVERSITY OF ILLINOIS CHICAGO · 1495 UNIVERSITY OF ABERDEEN · 1862 RĪGAS TEHNISKĀ UNIVERSITĀTE · PRINTFUL · UNIVERSITY OF LATVIA

Līdzfinansē Eiropas Savienība · 2027 Nacionālais attīstības plāns · Latvijas Zinātnes padome

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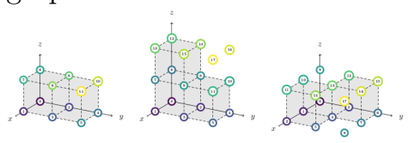
PostDoc Latvia · LATVIJAS UNIVERSITĀTE

Dynamic computational topology

Computational combinatorics

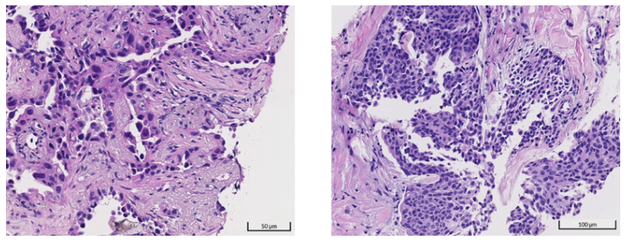
Motivation: Describe regions of 3D images whose boundary is (nearly) homeomorphic to $\mathbf{S}^2$ by edge-labeled 4-regular graphs.



Goal: Implement an efficient coding method. To use for medical scans of organs, quality control scans of channels etched in silicon.

Machine learning

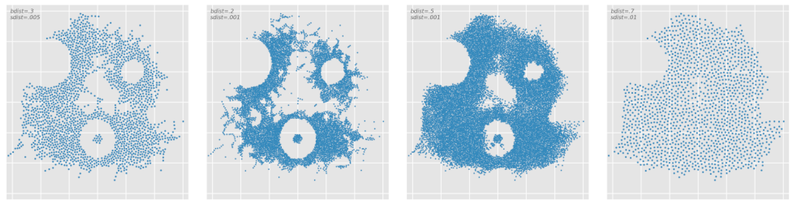
Motivation: Use topology to enrich training data and improve split-segmentation machine learning methods for image analysis .



Goal: Interpret a medical image of healthy and diseased tissue as having topological information

Eco-topology

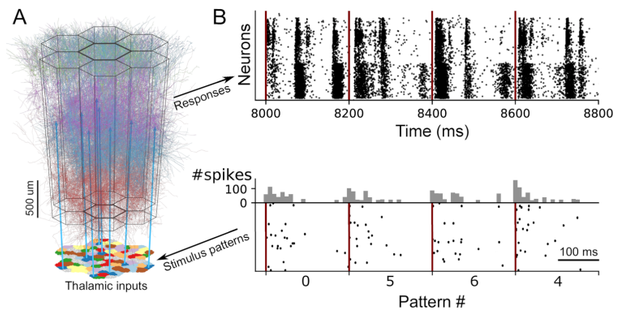
Main result: An alternative method to construct new inferences over existing species observations, ensuring the underlying topology of the hypervolume is not destroyed.



Current interest: Implement the method in C++ and R, sell it to ecologists, run it on as many datasets as possible.

Neuro-topology

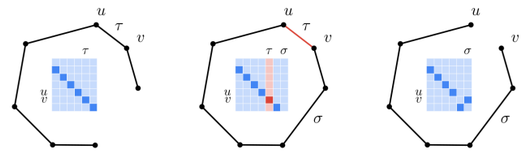
Main result: The activity of a small number of particularly selected neighbourhoods is enough to classify signals going through a neural circuit.



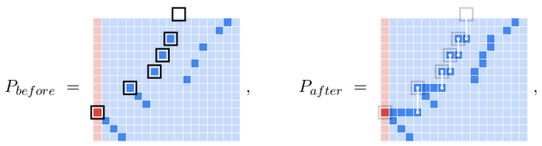
Current interest: Define a random model of a graph whose topology matches the topology of observed neural circuits.

Dynamic persistent homology

Main result: An implemented, constructive method to update the reduced boundary matrix from a persistent homology computation when simplices are removed from the filtration.



Key idea: Successive column additions in the standard barcode algorithm cancel each other out. The net change is determined by the minimal decreasing subsequence of pivots.



Current interest: Implement simplex addition and swapping into a usable software to update computations given any change in the filtration.

how much time I spend on this thing now

how much time since I've started working on this thing