



University
of Victoria

MATRIX INSTITUTE FOR APPLIED DATA SCIENCE NEWS

January 2020

As we complete our first full calendar year of operation, we wanted to recap the Matrix activities that occurred in 2019 and look ahead at what to expect in 2020.

Research Seminars and Events in 2019

Our most visible function has been a series of informative presentations with leaders from the data science knowledge and applications communities. We hosted a variety of speakers from across campus, other universities and industry that covered a [broad range of applied data science topics](#). We thank [Nishant Mehta](#) for helping us recruit speakers.

One of our main goals has been to connect the community and we have exceeded our expectations in a relatively short period of time. The seminars have been well attended by staff, faculty and students from across campus, including Math and Statistics, Business, Mechanical Engineering, Civil Engineering, Electrical Engineering, Computer Science, Physics and Astronomy, Chemistry, Humanities, Social Work, Medical Science, and the Institute on Aging, as well as practitioners from industry and government.



On February 13, 2019, we launched [Subspace](#), a student-led community of undergrad and graduate students involved in applied data science research at the University of Victoria.



On March 9, 2019, Matrix participated in IdeaFest, the University of Victoria's week-long festival of research, art and innovation. Researchers and students from Matrix and the Department of Computer Science gave presentations and hosted a poster session on machine learning. The event attracted more than 100 members of the general public.

On June 11, 2019, our annual symposium brought together more than 100 people from UVic, industry and government for a full day of talks, which featured a keynote by [Dan Russell](#), Google Senior Research Scientist and leader of the Search Quality & User Happiness group. At

the end of the day, we hosted a reception, sponsored by [Workday](#), where our Subspace student group presented posters related to their applied data science research and networked with members of the Victoria tech community.

On November 21, 2019, over 100 UVic Engineering students (undergrad and graduate), UVic faculty, and representatives from a dozen local tech companies attended a technology meet-and-greet social event hosted by our [Entrepreneurship@UVic](#) (E@UVic) partner, the [Alacrity Foundation](#).



New Faculty Members and Cross-Campus Partnerships

Our data science community continues to grow. In 2019, the Department of Computer Science welcomed [Ibrahim Numanagić](#), Assistant Professor and Canada Research Chair (Tier 2) in Computational Biology and Data Science.

[Kim Venn](#) and [Sebastien Fabbro](#) (Physics & Astronomy) and [Kwang Moo Yi](#) (Computer Science) have been collaborating closely over the past year. Specifically, they have worked together to analyze stellar spectroscopy with Deep Neural Networks, which is follow-up work to Venn and Fabbro's [StarNet paper](#). They have also looked into analyzing galaxy images with Generative Adversarial Networks to figure out their characteristics in a purely data-driven way — this work recently appeared at the Machine Learning for Physical Sciences Workshop held at the Advances in Neural Information Processing Systems (NeurIPS) Conference.

[Dennis Hore](#) (Chemistry) and [Bruce Wallace](#) (Social Work) have been running a free anonymous [drug checking and harm reduction service](#) called Substance at social service sites in Victoria, BC. They have collaborated with [Margaret-Anne Storey](#) and MSc student Jorin Weatherston (Computer Science) to explore enhancing test result delivery mechanisms through uncertainty visualizations applied within the drug checking context. The resulting visualization-enhanced reports convey uncertainty in the drug tests to empower end-users in their safety-critical decision-making.

Industry/Government Partnerships

Revela: With a strong push from our Matrix Leadership Advisory Board, E@Uvic and Alacrity teamed up to launch their latest start-up team, [Revela](#), to focus on commercial opportunities in managing data pipelines.

Data analytics support for the CL-Series (Water Bomber) Aircraft Program: This initiative supports Longview Aviation Capital Corporation to improve its ability to design the manufacturing systems and operations for the [CL-Series Aircraft](#). Our team developed intelligent multi-reinforcement machine-learning algorithms to understand unstructured data required in making 78,000 aircraft parts. This pilot project has achieved extremely promising results applying deep machine-learning and AI classification to the manufacturing of complex products. It has accelerated the return to production of the Canadair

amphibious fire-fighting aircraft, with an economic impact estimated at more than \$7 Million CAD over the next 24-36 months.

Alacrity/E@UVic partner companies: This [ecosystem](#) of business leaders, start-ups, investors, UVic grads and researchers continues to generate new opportunities for data-centric collaborations across a broad range of applications.

South Island Prosperity Project (SIPP): [David Bristow](#) supported Victoria's bid for federal funding for [smart cities innovation](#). Although this bid was ultimately unsuccessful, numerous new relationships and opportunities were identified.

National Research Council: NRC has reached out to institutions across Canada seeking to fund collaborative partnerships in areas such as AI for design, HCI, Privacy, Security, etc. For more information on NRC/industry partnerships, contact [Chris Flores](#), UVic's Industry Liaison Officer.

Students

Our [Subspace student group](#) continues to impress and inspire with their ability, energy, creativity and professionalism. With the September 2019 launch of our new [Masters of Engineering in Applied Data Science \(MADS\)](#) and the unprecedented worldwide demand for data scientists, our student numbers are expected to continue to grow. We thank the Subspace executive team for managing the interface between this broad student resource and Matrix activities.



Support and Funding

We thank the Office of the Vice-President Research, the Department of Electrical and Computer Engineering, and the Department of Computer Science for their continued support of Matrix.

What to Expect in 2020

We are pleased to be up and running and have created a basic framework for Matrix in terms of who we are and what we do. In 2020, we plan on continuing with the same basic format, while expanding available funding to support new collaborations across campus and externally.

Seminars and Events

Check our [events page](#) for our latest presentations and events. We plan to host a symposium early in the summer, meet-and-greets with potential employers and collaborators, and one or two seminars per month on a wide range of topics, including the dark web and data visualization.

Cross-Campus Partnerships

We will be facilitating discussions and collaborations in several areas, including:

- **Health Sciences Initiative (HSI):** Advanced data analytics, visualization, ethics and privacy are fundamental to the broad activities within this [campus-wide initiative](#).

- **Institute on Aging and Lifelong Health (IALH):** Scott Hofer, [IALH](#) Director, has reached out to collaborate with Matrix in several areas of mobile/digital health.

New Industry/Government Partnerships

Many seeds have been planted. We continue to expand activities with Alacrity/E@UVic partner companies and others, including Workday, IBM and Telus. NRC also continues to look for collaborative partnerships in areas such as AI for design, HCI, privacy, security, etc. These may provide useful gateways into collaborative projects with companies participating with BC's Digital Technology Supercluster.

Subspace

We will support Subspace as they continue to grow across campus and form connections with industry and government.

Funding

Several mechanisms are under consideration to bring additional funding into Matrix and to plan how to best use these funds to advance the prime Matrix objective of strengthening data science research impact at UVic.

Working Groups

To best address the many opportunities in front of Matrix, some organization may help. We have taken first steps in this direction with the beginnings of working groups in several areas.

Business Intelligence: A group from the Gustavson School of Business and the Faculty of Engineering (contact [Adel Guitouni](#)) created the Matrix Business Intelligence working group to advance inter-disciplinary research and university-industry collaboration on the application of BI concepts such as intelligent reasoning, planning, problem solving, abstraction, awareness, comprehension, innovation, and learning. The objectives of the working group are:

- to contribute to the development of an original way of thinking in the field of business intelligence;
- to support each member of the group to make methodological, theoretical or applied contributions;
- to keep the group active and open by means of regular meetings and an annual mini-conferences;
- to encourage cross-disciplinary research, industry-university collaborations, access to alternative funding opportunities, cross-disciplinary publications; and
- to facilitate teaching capacity building (e.g., shared teaching resources, Infrastructures, Experiential learning, Shared courses) across campus.

Advanced Analytics, Big Data and Machine Learning: We are working with [Belaid Moa](#) to launch this group to provide collaborative technical expertise in support of data-centric research across campus.

Included is the teaching of big data and advanced analytics in [PHYS 555 Advanced Computing and Machine Learning for Physics and Astronomy](#).

Quantum Machine Learning: In support of ongoing Canada Research Chair hiring activity in quantum computing, this group will focus on ML algorithms and tools to exploit the unique capabilities of emerging quantum computers.

Looking to get involved?

The activities described above address just a slice of what's possible with Matrix and are in no way meant to exclude other data science-related knowledge or applications research. Given the breadth of the opportunity space, we need the help of our members to bring their interests and opportunities into focus. So please help!

- Provide website-worthy descriptions and photos of your projects for posting on our [website](#).
- Join a Matrix working group.
- Organize a working group in your area of interest. (We may be able to offer support.)
- Suggest speakers, seminars and events.
- Join our small management team to help steer, publicize, fund, etc.
- Students: [join Subspace](#), build bridges to groups across campus, and help with events.

Best wishes to everyone for 2020!

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