Advancing Artificial Intelligence in Medicine: The Temerty Centre for Artificial Intelligence Research and Education in Medicine (T-CAIREM)

May 2024

Temerty Centre for AI Research and Education in Medicine
University of Toronto

Artificial Intelligence in Medicine: The Canadian Landscape

WATERLOO ARTIFICIAL INTELLIGENCE
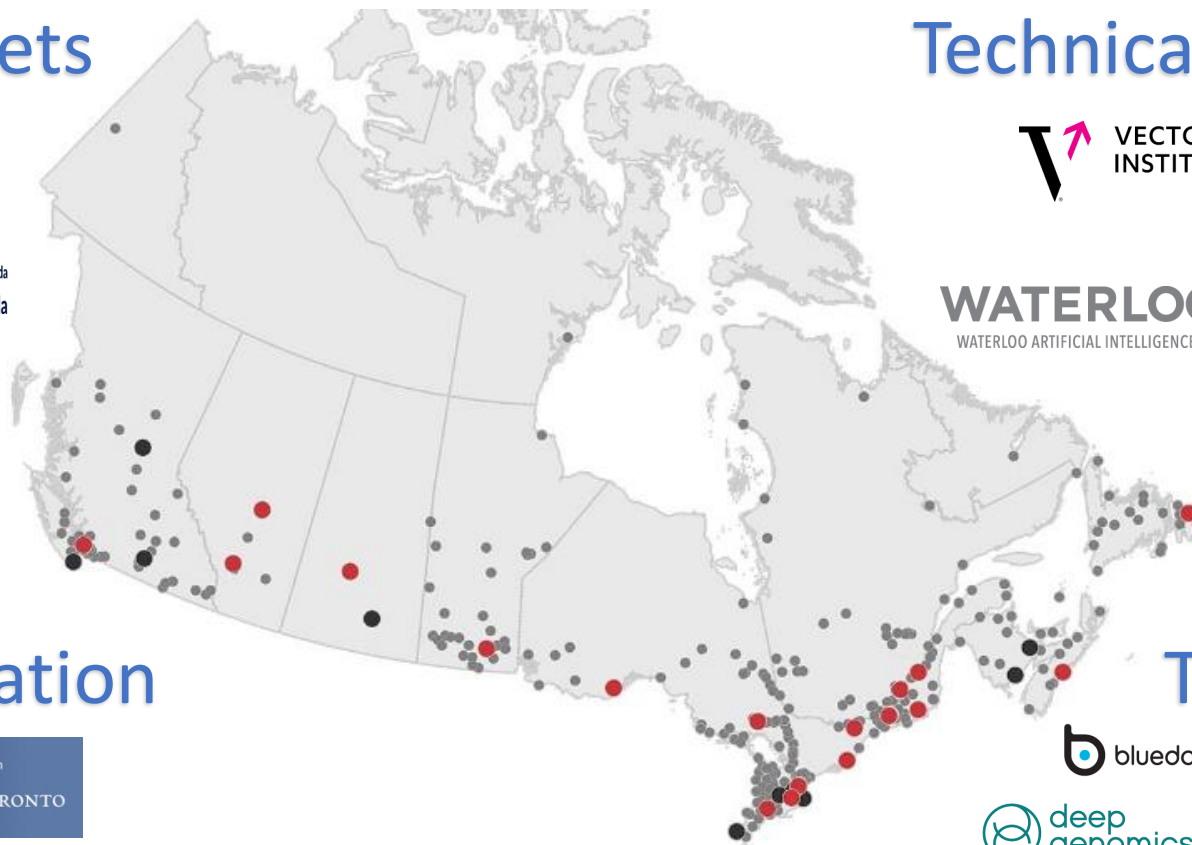
About Waterloo.A...

AI can pred...

TUESDAY, FEBRUARY...

Faculty of Science

About   Programs   Departments   Research & Teaching   Student Se...

Artificial intelligence health

Study by UAlberta researchers uses machine learning to identify sc...

Andrew Lyle - 28 January 2019

The boundaries of artificial intelligence techniques are continually being advanced to improve our ability to interpret complex medical imaging results diagnose diseases. And now, a new tool developed by University of Alberta researchers diagnoses schizophrenia from patient brain scans-a diagnosis t has historically relied on subjective data of patient experiences, rather than from scans.

The study brought together campus expertise in two key areas: machine lear and psychiatry. Sunil Kalmady, lead author on the study and a postdoctoral f at the University of Alberta, explains the traditional difficulty in diagnosing th disease, and how machine learning was able to present a solution.

"Schizophrenia is characterized by constellation of symptoms that might co- in patients. Two individuals with the same diagnosis might still present diffe symptoms," said Kalmady. "This often leads to misdiagnosis. Machine learni this case, is able to drive an evidence-based approach that looks at thousan features in a brain scan to lead to an optimal prediction."
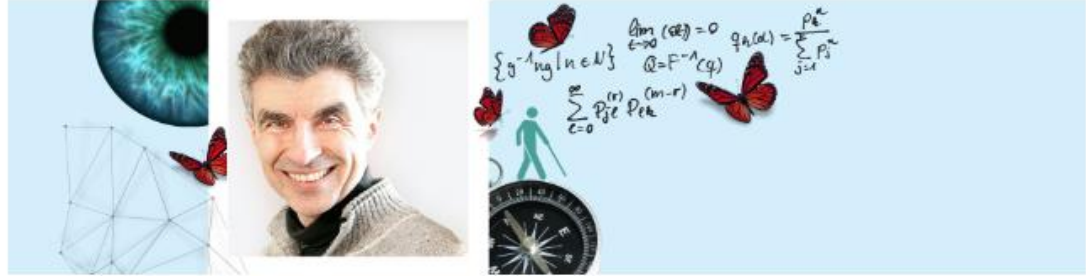
The result is EMPaSchiz (Ensemble algorithm with Multiple Parcellations for Schizophrenia prediction), a model that has been trained on scans from mar patients diagnosed with schizophrenia.

Université de Montréal

UdeM ⌄   STUDIES ⌄   FACULTIES AND SCHOOLS ⌄   RESEARCH ⌄   ACTIVITIES AND SERVICES ⌄   OUR CAMPUSES ⌄

The University of Montreal and of the world

The University of Montréal and of artificial intelligence helping the blind

Yoshua Bengio

Intelligence is everywhere – even in everyday objects. The phenomenon is part of what we call artificial intelligence in the near future, collaboration between Yoshua Bengio's team of researchers and HumanWare, a Drummondville company, will make it possible to design intelligent tools for the blind, based on advances in AI research here at Université de Montréal.

Simply put, artificial intelligence, is a way of teaching computers to make the data they compile "speak." For blind people, a large quantity of images could be superimposed to create a sort of customized map, then converted into useful information to help them get around. Thanks to AI, it will be possible for the blind to "see" their surroundings.

Next-generation intelligent GPS devices will be able to indicate the locations of sidewalks, stoplights, buildings and the many obstacles that blind people encounter when moving about a city.

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Cancer and Mental Health

Prediction of Mental Health needs

UBC

Laparoscopic Cholecystectomy

AI-guided surgery

UHN
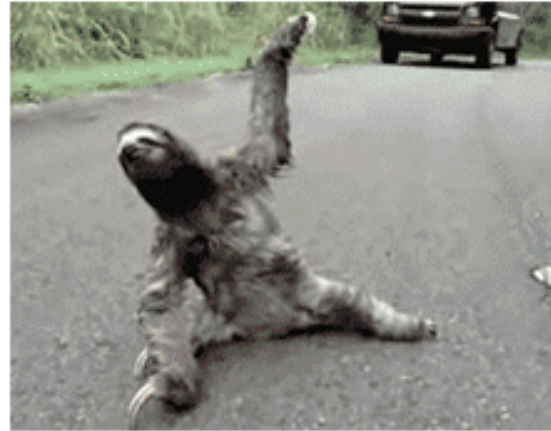
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Translating Research Is Like Yoga...

Research Does NOT Equal Practice

MIT Technology Review

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ARTIFICIAL INTELLIGENCE

Hundreds of AI tools have been built to catch covid. None of them helped.

Some have been used in hospitals, despite not being properly tested. But the pandemic could help make medical AI better.

By Will Douglas Heaven   July 30, 2021

UNITY HEALTH TORONTO

Map data © 2019 Google

Providence Healthcare
est. 1857

T O R O N T O

St. Michael's Hospital
est. 1892

St. Joseph's Health Centre
est. 1921

Our People:

11,271 Staff

5,773 Medical trainees and health professional learners

1,503 Physicians

1,195 Researchers, scientists, research staff and students

Our Care:

1,625,000+ Ambulatory visits each year

172,000+ Emergency Department visits each year

5,600+ Babies born at our sites each year

357,000+ Inpatient visits each year

54,341 Family Health Team patients rostered

1,423 Total beds across our sites

AI is a Strategic Pillar

Dedicated Data Science Team

3

Responsible Implementation of AI in Healthcare
Some Considerations

|			
Pre-Implementation	Bias Assessment	Ethics Assessment	Communication and Clinical Validation
Soft Launch	Silent Testing	External Validation and Explainability Evaluation	
Implementation and Post Implementation	Communication (Re-iterating Expectations)	Monitoring, Evaluation, and Maintenance	

CHARTwatch

› 20% reduction in
unplanned mortality

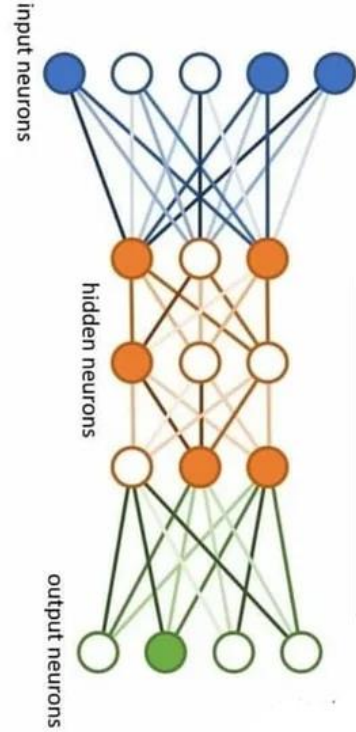# Breaking Down Silos

The Temerty Family
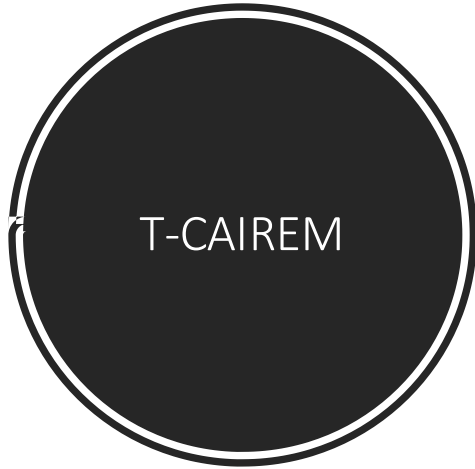
T-CAIREM

THIS IS A NEURAL NETWORK.

IT MAKES MISTAKES.
IT LEARNS FROM THEM.

BE LIKE A NEURAL NETWORK.

input neurons

hidden neurons

output neurons

Background

- The Temerty Centre for Artificial Intelligence Research and Education in Medicine (T-CAIREM) at the University of Toronto
  - Supported by a generous donation from the Temerty family
  - Goal: Advance AI in medicine through multidisciplinary collaboration between relevant stakeholders such as healthcare providers, statisticians, computer scientists, engineers, and industry

- T-CAIREM: launched in October 2020
  - AI is a 'team sport' requiring multidisciplinary collaborations within and across organizations

T-CAIREM by the Numbers

Community

Over 1,500 members

Over 3,000 social media followers

24 Canadian university partners

Research

Provided $1.5M in research grants

Funded 12 research projects

More than 70 adjudicators

Education

11 local experts and 10 international speakers

29 Trainee Rounds Presenters

73 paid internships

Infrastructure

Over 55,000 de-identified patient health records

Over 150 users

5 public datasets

T-CAIREM National AI in Medicine Network

- **T-CAIREM is committed to growing its membership base to create mutually beneficial collaborations that lead to advancements in the study, education, and utilization of AI in medicine.**

- 24 universities part of the T-CAIREM National Network

- T-CAIREM membership is now extended to faculty, researchers and students across Canadian Universities and their affiliate institutions:

  https://tcairem.utoronto.ca/join-us

T-CAIREM Membership

The T-CAIREM Network is transforming health through Artificial Intelligence (AI)

T-CAIREM's free membership is open to students, faculty, researchers, clinicians, and staff of more than 30 partner universities, research centres, and hospitals. Come & join us!

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tcairem.utoronto.ca/join-us

T-CAIREM Membership = 1124

University of Toronto = 966

McGill University = 55

McMaster University = 23

University of Manitoba = 15

University of British Columbia = 10

Others = 55

Help us grow our membership across Canada!

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Member of Global AI in Medicine Community

Winner of the 2022 AIMed Hospital/Institution of the Year Award

T-CAIREM is a member of the global Alliance of Centres of Artificial Intelligence in Medicine (ACAIM) alongside:

And **over 50 other AI in Medicine Centres** around the globe

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T-CAIREM Expansion
www.tcairem.utoronto.ca
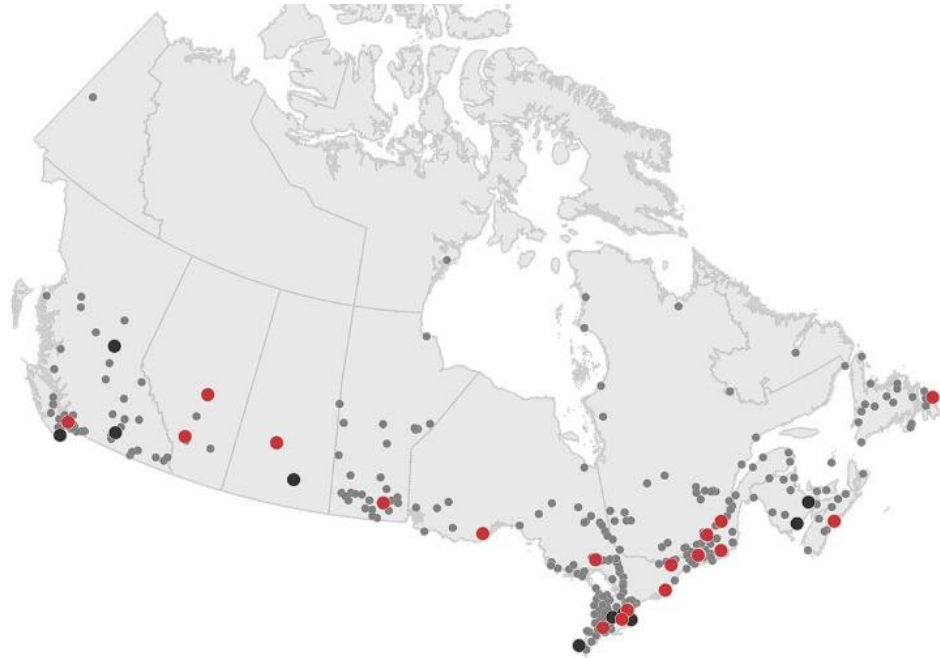
International Partnerships

➢ **Co-operative research** between scholars through collaborative grants.

➢ **Visiting academic staff**: Speaker Series, lectures, and consultations.

➢ **Visiting students**:
  - Summer Research Studentships for undergraduate and professional degree students.
  - Fellowships for post-doctoral trainees.

Multi-Modal Data and the Future of Health AI

REGISTRATION OPEN!

The T-CAIREM AI in Medicine Symposium takes place on June 17 at the University of Toronto's Hart House.

(This in-person event will also be streamed online.)

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Open Invitation to Join T-CAIREM

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T-CAIREM Website: www.tcairem.utoronto.ca