



Montreal, July 8-12

DLM2024

A background image featuring various medical scans, including MRI and CT slices of the brain, overlaid with a grid pattern and a blue color scheme. The text is centered over this background.

**DEEP
LEARNING
FOR MEDICAL
IMAGING
SCHOOL**

5th edition
July 8-12
ÉTS Montréal



Welcome Message

Dear participant,

It is with great pleasure that we welcome you to the fifth edition of the Summer School on Deep Learning for Medical Imaging, held from July 8th to 12th at the École de Technologie Supérieure (ÉTS) Campus.

This MICCAI-labeled research-training event will cover important aspects of the fast developing area of deep learning for medical image analysis. We will introduce fundamental concepts of machine learning and present more advanced concepts of deep learning, including recent deep neural architectures for image classification, semantic segmentation and object detection. We will also provide key insights on how to use deep learning to solve challenging problems of medical imaging.

In the following pages, you will find practical information needed for a successful week of training, the Summer School's program, as well as a short presentation of the round-table discussion participants and our sponsors.

We hope this event will fulfill your expectations and wish you a great week.

The local organization committee,

Pierre-Marc Jodoin (Université de Sherbrooke, Canada)

Christian Desrosiers (École de technologie supérieure, Canada)

Jose Dolz (École de technologie supérieure, Canada)

Organization

The organizing committee

Pierre-Marc Jodoin (Université de Sherbrooke, Canada)

Christian Desrosiers (École de technologie supérieure, Canada)

Jose Dolz (École de technologie supérieure, Canada)

Thomas Grenier (Université de Lyon, CREATIS, LabEx PRIMES, France)

Michaël Sdika (Université de Lyon, CREATIS, LabEx PRIMES, France)

Local co-organizers

Ghazal Danaee (École de technologie supérieure, Canada)

Sedigheh Dargahi (École de technologie supérieure, Canada)

Sahar Dastani (École de technologie supérieure, Canada)

Damien Djomby (École de technologie supérieure, Canada)

Sina Hajimiri (École de technologie supérieure, Canada)

Shambhavi Mishra (École de technologie supérieure, Canada)

Julio Silva Rodriguez (École de technologie supérieure, Canada)

Benoit Verreman (École de technologie supérieure, Canada)

Zineb ElYamani (Université de Sherbrooke, Canada)

Célia Goujat (Université de Sherbrooke, Canada)

Arnaud Judge (Université de Sherbrooke, Canada)

Thierry Judge (Université de Sherbrooke, Canada)

Jérémi Lévesque (Université de Sherbrooke, Canada)

Fabien Milloz (Université de Lyon, CREATIS, LabEx PRIMES, France)



Scientific committee

Pierre-Marc Jodoin (Université de Sherbrooke, Canada)

Christian Desrosiers (École de technologie supérieure, Canada)

Jose Dolz (École de technologie supérieure, Canada)

Olivier Bernard (Université de Lyon, CREATIS, LabEx PRIMES, France)

Nicolas Duchateau (Université de Lyon, CREATIS, LabEx PRIMES, France)

Rémi Émonet (Université de Lyon, CREATIS, LabEx PRIMES, France)

Thomas Grenier (Université de Lyon, CREATIS, LabEx PRIMES, France)

Fabien Millioz (Université de Lyon, CREATIS, LabEx PRIMES, France)

Emmanuel Roux (Université de Lyon, CREATIS, LabEx PRIMES, France)

Speakers

Pierre-Marc Jodoin (Université de Sherbrooke, Canada)

Christian Desrosiers (École de technologie supérieure, Canada)

Jose Dolz (École de technologie supérieure, Canada)

Mohammadhadi Shateri (École de technologie supérieure, Canada)

Michaël Sdika (Université de Lyon, CREATIS, LabEx PRIMES, France)

Nicolas Thome (Sorbonne University, France)

Mohammad Havaei (Google inc.)

Eric Kerfoot (King's College London, UK)

Round-table panel

Nicolas Thome (Sorbonne University, France)

Sylvain Bouix (École de technologie supérieure, Canada)

Hadi Chakor (MD, Diagnos inc.)

Laurent Létourneau-Guillon (MD, Centre Hospitalier Universitaire de Montréal)

Rola Harmouche (National Research Council Canada, moderator)

Practical Information

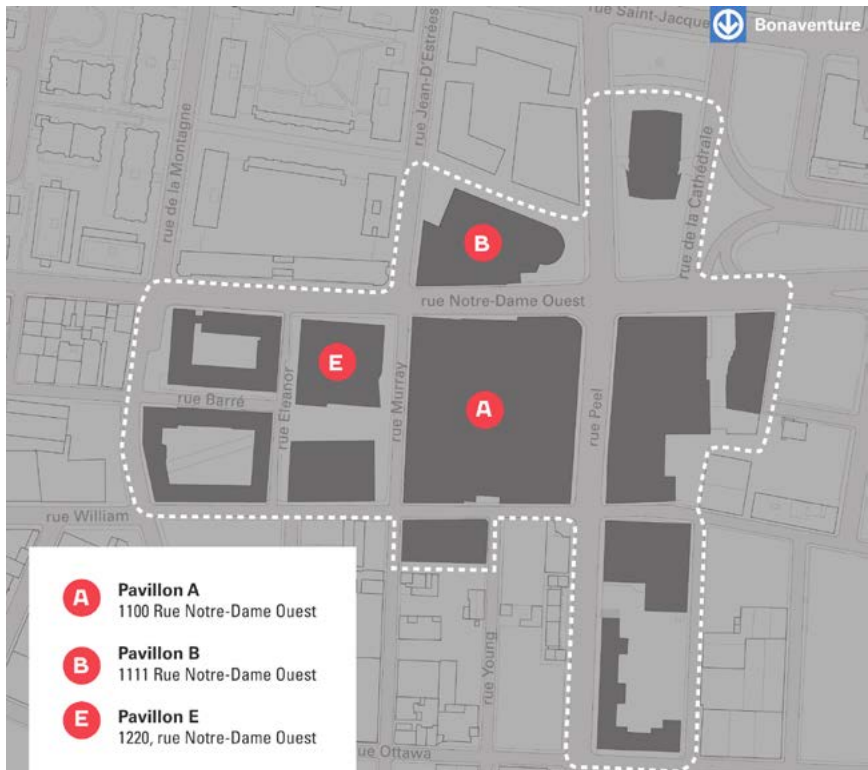
The school will take place in:

Building A of the Ecole de Technologie Supérieure (ETS) of Montreal

Located at:

1100 Notre-Dame St W, Montreal.

Here is a map of the campus to find your way around:





Wi-Fi

You can enjoy free Wi-Fi from anywhere on campus, using the following login:

Network: **ETS-Invites**

Login: **wifi-even@etsmtl.ca**

Password: **Eve-2020**

Lectures and Hand-on sessions

The lectures will be held in the Auditorium, located in room A-1600 of Building A (see map above). To reach the Auditorium, follow signs to take the stairs or elevator right beside the cafeteria.

The hands-on sessions will be held in the following labs:

Hands-on session 1 (July 9, 14h00 - 16h30): **A-3220 & A-3230**

Hands-on session 2 (July 10, 14h00 - 17h00): **E-4021 & E-4022**

Hands-on session 3 (July 11, 14h00 - 17h00): **E-4021 & B-2210**

Hands-on session 4 (July 12, 14h00 - 17h00): **A-3220 & A-3230**

You may go to any of the two rooms. The instructors will then assign you to a room based on available space.

Lectures and hands on material and videos are available here:

<https://jodoin.github.io/dlmi2024/>

Password: **dlmi2024**

Stairs



Auditorium

Lab computers

For those without a laptop, you may use a PC in the labs to do the tutorials. Use the following information to login on these computers:

login: **wifi-even@etsmtl.ca**

password: **Eve-2020**



Coffee breaks

Coffee breaks will be held in the windowed space right outside the Auditorium in Building A.

Lunches

Lunches will be held in a closed zone of the Cafeteria in Building A. You will receive 5 coupon cards, one per day, which can be redeemed at the cash register. Please do not lose them.

Monday: Cocktail 17h30 - 19h30

A welcome cocktail event will be held at the **Resto-Pub 100 Génies** located on **the first floor of Building B** (see campus map).

Coupon tickets can be exchanged for drinks during the cocktail; don't forget to bring them with you.

To get there, take the large staircase at the entrance of the building.



Resto-Pub 100 Génies

Tuesday: Poster session 16h30 - 18h00

Join us at the poster session on Tuesday to learn about the research of other participants. This session will take place **outside the main auditorium in Building A**.

Participants are encouraged to install their poster on any available stand during the day.

Wednesday: Social event 18h00 - 18h45

We invite you to discover one of Montréal's most iconic buildings, **the Notre-Dame Basilica**, in a unique way with the AURA immersive light show. The Basilica is in the beautiful Old Montreal neighborhood, a 20-minute walk away from ÉTS.

The show starts at 18h00 and last about 45 minutes - please don't be late! You will be free to explore the neighborhood after the show and have dinner in any of its many restaurants.

Note: there will be a group of volunteers walking to the Notre-Dame Basilica. The group will leave ÉTS from the main entrance of Building A at 17h15. Feel free to join us!

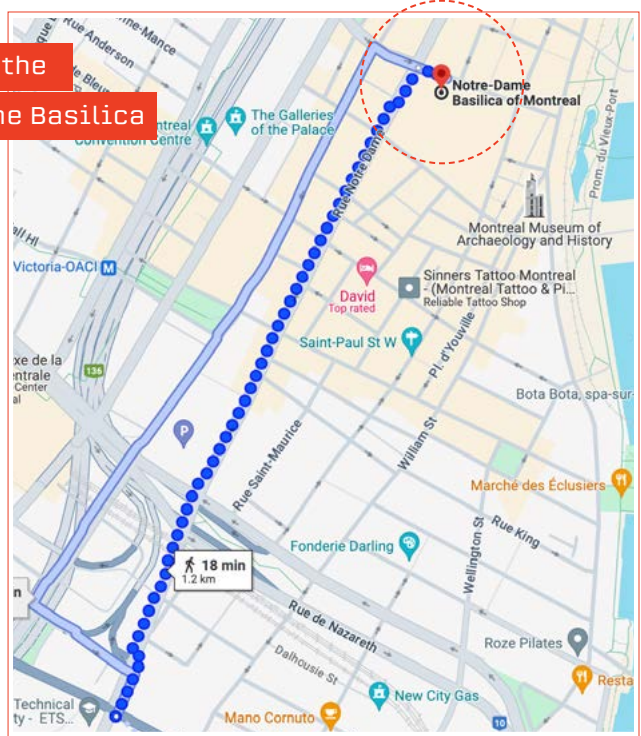
Thursday: Banquet dinner 18h00 - 21h30

We will hold a banquet dinner at **the Salon des diplômés Vidéotron** located on the **second floor of Building E** (see campus map).

To get there, take the large staircase at the entrance of the building.



How to get to the
Notre-Dame Basilica



Salon des diplômés Vidéotron

School Program

Monday • July 8

- 08h00 - 09h00 Registration and Breakfast
- 09h00 - 09h15 Welcome talk
- 09h15 - 10h30 Basics of deep learning Part 1 (**Pierre-Marc Jodoin**)
- 10h30 - 10h45 Coffee Break
- 10h45 - 12h00 Basics of deep learning Part 2 (**Pierre-Marc Jodoin**)
- 12h00 - 13h30 Lunch at ÉTS cafeteria
- 13h30 - 15h00 Basics of deep learning Part 3 (**Christian Desrosiers**)
- 15h00 - 15h30 Coffee break
- 15h30 - 17h00 Convolutional neural networks (**Michaël Sdika**)
- 17h30 - 19h30 Cocktail at the ÉTS pub

Tuesday • July 9

- 08h30 - 09h00 Breakfast
- 09h00 - 10h30 Generative and adversarial methods for medical imaging imaging (**Mohammadhadi Shateri**)
- 10h30 - 11h00 Coffee Break
- 11h00 - 12h30 Advanced concepts in deep learning Part 1 (**Nicolas Thome**)
- 12h30 - 14h00 Lunch at ÉTS cafeteria
- 15h00 - 15h30 Coffee break
- 14h00 - 16h30 Hands-on session 1: **Introduction, Classification from machine learning to deep learning**, rooms A-3220 & A-3230
- 16h30 - 18h00 Poster session (outside the Auditorium)



Wednesday • July 10

- 08h30 - 09h00 Breakfast
- 09h00 - 10h30 Uncertainty and explainability (**Michael Sdika**)
- 10h30 - 11h00 Coffee Break
- 11h00 - 12h30 Typical medical imaging issues (**Mohammad Havaei**)
- 12h30 - 14h00 Lunch at the ETS
- 14h00 - 17h00 Hands-on session 2: **Segmentation using deep learning**,
rooms E-4021 & E-4022
- 18h30 Social event at the Notre-Dame Basilica

Thursday • July 11

- 08h30 - 09h00 Breakfast
- 09h00 - 10h30 Weakly supervised deep learning
(**Jose Dolz** and **Christian Desrosiers**)
- 10h30 - 11h00 Coffee Break
- 11h00 - 12h30 Round table (**Nicolas Thome, Sylvain Bouix, Hadi Chakor, Laurent Létourneau-Guillon**) What are the challenges for AI to break into clinic?
- 12h30 - 14h00 Lunch at the ETS
- 14h00 - 17h00 Hands-on session 3: **Variational Autoencoders**,
rooms E-4021 & B-2210
- 18h00 - 21h30 Banquet dinner

Friday • July 12

- 08h30 - 09h00 Breakfast
- 09h00 - 10h30 Advanced concepts in deep learning Part 2 (**Jose Dolz**)
- 10h30 - 11h00 Coffee Break
- 11h00 - 12h30 MONAI : open-source, community-supported framework for Deep learning in healthcare imaging (**Eric Kerfoot**)
- 12h30 - 12h45 Closing remarks
- 12h45 - 14h00 Lunch at the ETS
- 14h00 - 17h00 Hands-on session 4: **Foundation models**,
rooms A-3220 & A-3230



Round-table Discussion

Thursday July 11, 11h - 12h30

What are the challenges for AI to break into clinic?

Moderator



Rola Harmouche is a Research Officer at the National Research Council Canada, where she works on developing machine learning tools for medical image analysis. She was a postdoctoral researcher at the Brigham and Women's Hospital and the Harvard Medical School, and she received her PhD from École Polytechnique in Montreal.



Panel



Nicolas Thome is Professor at Sorbonne University in Paris, France, and Head of the Machine Learning for Robotics Team of the ISIR lab. Professor Thome's research centers on deep learning and computer vision.



Sylvain Bouix is professor at ÉTS in the Department of Software Engineering and IT, and holder of the Canada Research Chair in Neuroinformatics for Multimodal Data. Professor Bouix's work is at the intersection of neuroscience, medical imaging, informatics, and computer science.



Hadi Chakor has a MD degree with specialization in ophthalmology and is Chief Medical Officer (CMO) at DIAGNOS Inc. Dr. Chakor's research in ophthalmology focuses on the application of artificial intelligence and image analysis to improve screening, diagnosis, and management of eye diseases, with a particular interest in diabetic retinopathy, retinal hypertension, and diabetic macular edema.



Laurent Létourneau-Guillon is Clinical Associate Professor in the Department of radiology, onco-radiology and nuclear medicine of the University of Montreal. Dr. Létourneau-Guillon is also a Neuroradiologist at the Montreal University Hospital Center (CHUM). His research interests include the development of image-based prediction models for hemorrhagic stroke outcome prediction and the validation of data-driven neuroimaging analysis applications.

Gold Sponsors



Diagnos is a publicly-trading Artificial Intelligence company focused on revolutionizing healthcare by developing cloud-based clinical decision support systems designed to enable eye health professionals in making more informed decisions about patient care.



The first objective of **PRIMES** (Physics, Radiobiology, Medical Imaging and Simulation) is to develop new concepts and methods for the exploration, diagnosis and therapy of cancer and pathologies associated with aging. PRIMES covers various fields ranging from fundamental physics to instrumentation, from radiobiology to data acquisition and processing and image reconstruction, simulation and modeling using computers.



Founded in 1974, the **École de technologie supérieure** is a constituent of Université du Québec. Specialized in applied teaching in engineering and technology transfer to companies, where professors, engineers and researchers are recognized for their practical, industrial and innovative approaches. In any given year, 25% of all engineers receiving a diploma from an engineering school or faculty in the province of Quebec graduate from ÉTS. It is ranked first in Quebec and second in Canada for the total number of engineering diplomas awarded annually.



The **Centre Hospitalier Universitaire de Sherbrooke (CHUS)** is the public healthcare network in Sherbrooke, Quebec, Canada, affiliated with the Université de Sherbrooke. The CHUS offers general, specialized and sub-specialized medicine and is the teaching hospital in the administrative regions of Estrie, Centre-du-Québec, and the eastern portion of the Montérégie.

Silver Sponsors



The **University of Sherbrooke (UdS)** is a large public French-language university in Quebec, Canada with campuses located in Sherbrooke and Longueuil. It is one of two universities in the Estrie region of Quebec, and the only French-language university for the region.



Google serves customers worldwide by focusing on web-based search and display advertising tools, search engine, cloud computing, software, and hardware. Its mission is to organize the world's information and make it universally accessible and useful.

Bronze Sponsors



Responsible for research valorisation at INSA Lyon, **INSAVALOR** fosters relationships between the laboratories and businesses in need of technology solutions, skills and training for their innovative projects.

Centre d'imagerie moléculaire de Sherbrooke (CIMS)

The **CIMS** brings together preclinical and clinical imaging, as well as all the resources for the development, validation and production of new scanners and new biomarkers for three-dimensional imaging in animals and humans. It offers access to a platform of state-of-the-art equipment within a unique center in Quebec for more than fifty fundamental, preclinical and clinical research projects.

What to do in Montreal

L'International des Feux Loto-Québec

(Annually from June to August)

The perfect punctuation to those city summer nights, the eye-popping fireworks displays of Montréal's International des Feux Loto-Québec sees international teams of pyrotechnic wizards compete for the year's best aerial spectacle. Each year also features a musical tribute, awe-inspiring fireworks timed with hit songs by the likes of ABBA and Elton John. Join the crowds around and on Jacques-Cartier Bridge or the VIP audiences seated front row centre at La Ronde and sing along.

MONTREAL COMPLÈTEMENT CIRQUE

July 4 to 14, 2024

Montréal goes completely circus each year, as the streets transform into the world's biggest open air Big Top. With countless performances of derring-do and 'how did they do that?' spectacle, MONTREAL COMPLÈTEMENT CIRQUE truly takes over the streets (and skies!) every July. Keep an ice pack handy—you might get whiplash from all of the acrobatics flying by.

<https://montrealcompletementcirque.com/>

Festival International Nuits d'Afrique

July 9 to 21, 2024

For yearly four decades, the Festival International Nuits d'Afrique has presented a packed programme of over 100 performances, activities and workshops celebrating Montréal's Caribbean, Latin American and African diaspora. Featuring performers from more than 30 countries, this year is certain to be another huge crowd-pleaser. Fans will also enjoy the Nuits d'Afrique's concert series held throughout the year—listings available here:

<https://www.festivalnuitsdafrique.com/>



SoulFest

July 11 to 14, 2024

Celebrating soul, motown, R&B, gospel and funk music, SoulFest Montréal takes place at the iconic Square Saint-James, and promises to transform the site into a veritable outdoor dance floor. Shows are also presented at the chic cabaret Le Balcon. SoulFest Montréal is proud to present music icons such as Kim Richardson, Freddie James, Michelle Sweeney, Dawn Tyler Watson and many more.

<https://www.thesoulfest.com/>

La Guinguette du Vieux-Montréal

July 11 to 14, 2024

Bringing the feel of a waterside resort to Old Montréal, La Guinguette du Vieux-Montréal brings together live music, games, dancing and DJs with delicious food from eight restaurants and a perfectly on-point summer vibe. And pick up some extra treats to take home from a roster of Québec artisans at the Tropical Market.

<https://lesguinguettes.ca>

Source: *Tourisme Montreal* (<https://www.mtl.org/>)

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