

# Canadian Engineering Competition 2025

Programming Competition

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# Agenda | Ordre du jour

- Choice of Language | Choix de la Langue
- Background and Challenge | Contexte et Défi
- Scoring Metrics | Critères d'évaluation
- Logistics and Timeline | Logistique et Programme
- Presentations | Présentations
- Questions | Questions

# Choice of Language | Choix de la langue

## SUBJECT TO CHANGE!

Competitors may present in English or French

- Throughout the design period, questions should be submitted either on the Discord channel specific for programming or in person.
- Questions will be translated and responded to in both languages on the Discord channel.

# Background and Challenge

## Contexte et Défi

# Background | Contexte

## **Background**

- On August 7, 2023, Destiny Rennie, a young Mi'kmaq woman, passed away tragically from fungal meningitis, a disease with a 50% mortality rate.
- Missteps in her treatment timeline at Soldiers Memorial Hospital (Middleton, NS) and the subsequent delay in treatment led to her death.

## **Healthcare Challenges Highlighted**

- Overwhelmed hospitals and medical staff.
- Long emergency room wait times in Nova Scotia (1-7 hours).
- Critical delays in diagnostic imaging, with waits of over 100 days for MRI/CT scans.

# Background | Contexte

## Government Response and Technological Innovation

- In Fall 2024, the Nova Scotia Government allocated **\$42 million** to implement AI in healthcare:
  - **Stage 1 (2024):** Increase patient access to information (e.g., wait times).
  - **Stage 2 (2025):** Automate preliminary imaging diagnostics for X-rays, using machine learning to analyze thousands of anonymized images.

## The Role of JBOW Hospital

- JBOW Hospital at Sexton Campus, NS, seeks to transform imaging diagnosis for brain injuries.
- A competition is underway to develop a program capable of interpreting MRI brain scans to aid diagnosis and treatment.

# Background | Contexte

## **Key Questions and Ethical Considerations**

- Liability in case of incorrect AI-based diagnoses.
- Balancing caution in AI interpretation against wasting medical resources.
- Defining the role of automation and AI in the medical field.

# Challenge | Défi

## **Objective**

- Develop and implement a modern program to aid JBOW Hospital in diagnosing and treating patients with brain tumors.
- The program must determine whether a brain tumor is present in MRI scans.
- In the testing period, x amount of images will be r u n through your program.

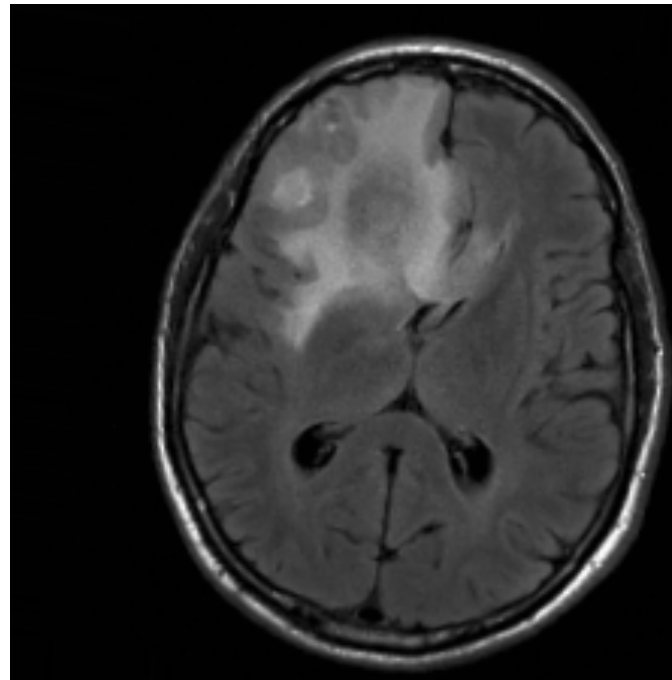


# Challenge | Défi

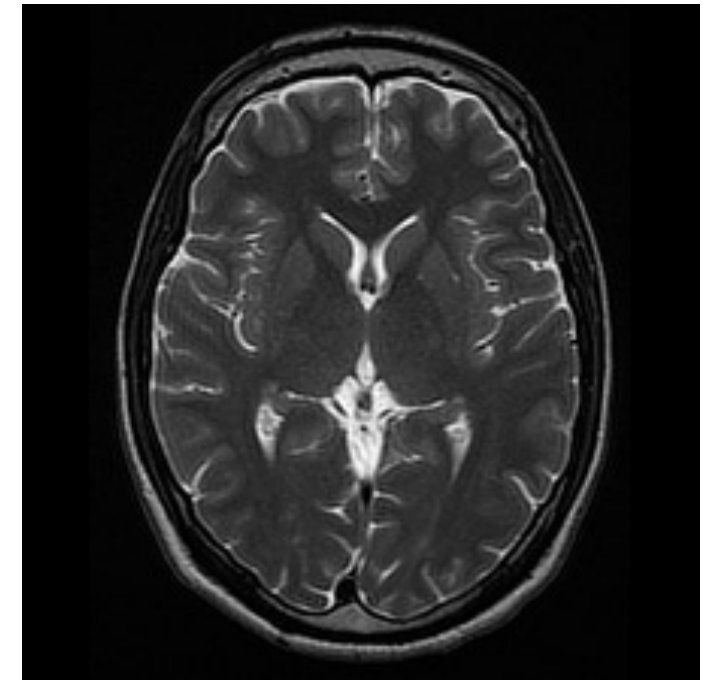
## Resources Provided

- Access to a comprehensive database of thousands of labeled MRI brain images:

**"Yes"**: Tumor present (unhealthy brain).



**"No"**: No tumor (healthy brain).



# Challenge | Défi

- **Challenge Requirements**

- **1.Image Processing:**

- Analyze MRI scans and build a detection model.

- **2.Accuracy Testing:**

- Competition directors will test the program with a set number of random MRI images (healthy and unhealthy).
    - Output results must classify scans as “yes” or “no” and export data to Excel or Google Sheets.

- **3.Optional Feature:**

- Include tumor localization and classification to support treatment planning.

## **Deliverables**

- A program that achieves reliable tumor detection.
- Accurate and organized data presentation in spreadsheet format.

# Challenge | Défi

Model Output (Probability)	Class (Tumor/No Tumor)	Confidence of Tumor Present
0.95	Tumor	High Confidence
0.80	Tumor	Considered Positive
0.75	Tumor	Lower Confidence
0.65	Tumor	Adjusted Threshold
0.55	Tumor	Adjusted Threshold
0.50	No Tumor	Traditional Threshold
0.45	No Tumor	Below Threshold
0.30	No Tumor	Low Confidence

*Table 1: Truth Table*

# Scoring Metrics

## Critères d'évaluation

# Judging Structure | Structure et Jugement

Evaluation Rubric

Category	Sub-Item	Evaluator	Weight
<b>Strategy and Algorithm</b>	1. Simplicity	Judges	/5
	2. Ingenuity		/10
	3. Ability to Achieve Desired Outcome*		/20
<b>Code</b>	1. Structure	Judges	/5
	2. Consistency		/10
	3. Readability		/5
	4. Efficiency		/10
<b>Data Output</b>	1. Ease of Use	Judges	/5
	2. General Aesthetics		/5
	3. Creativity		/5
<b>Presentation</b>	1. Design Process and Justification	Judges	/7
	2. Design Critique		/4
	3. Body Language, Respect and Professionalism		/4
	4. Visual Aids		/2
	5. Response to Questions		/3
<b>Bonus</b>	1. Most Correct Data Output	Directors	/10
<b>Penalties</b>	See the below penalties matrix.	Judges	
<b>Total</b>			<b>/100</b>

# Penalties | Sanctions

Scoring Penalties	
Plagiarism	<b>Elimination</b>
School or Regional Apparel During Presentation	<b>Elimination</b>
Documents Received After Deadline	<b>-50 points per instance</b>
Absent Team Member	<b>-25 points per instance</b>
Entering Presentation Room Before Allotted Time (after first offense)	<b>-10 points per instance</b>
Disclosure of School or Region in Presentation Files/Documents	<b>-10 points per instance</b>
Verbal Disclosure of School or Region During Presentation	<b>-10 points per instance</b>
Hints provided	<b>-5 points per hint</b>

# Code Demonstration | Démonstration du Code

## Expectations

- Provide a short demonstration showcasing the functionality of your program.
- The program will be tested on one of the competition Director's machines.

## Technical Setup

- Directors will pre-install any languages and packages specified in your submission's README file.

## Submission Guidelines

- Ensure the README includes **clear, detailed instructions** for:
  - Compiling the code.
  - Running the program successfully.

# Logistics and Timeline

## Logistique et Programme



# Competition Case | Cas de Concours

- The competition case document and all other necessary documents will be sent in a GitHub Repository by email at 9:00 am AST.
- You will have x hours to complete all deliverables.
- ANY DELIVERABLES PUSHED TO YOUR REPOSITORY'S BRANCH AFTER 5:30 pm AST WILL NOT BE CONSIDERED!
- The push closest to and preceding the deadline will be taken as your submission.
- All questions are recommended to be posted on the programming discord channel

# Time Warnings | Avertissements de Temps

The following time warnings will be posted on Discord during the design phase:

- 3 hours before the deadline
- 1 hour before the deadline
- 30 minutes before the deadline
- 10 minutes before the deadline

# Deliverables (Codes) | Produits à fournir (Codes)

## Submission Guidelines

- All code must be uploaded to the **Main branch** of the provided GitHub repository before the **8-hour deadline**.
- Only code submitted by the deadline will be judged.
  - The last modified timestamps will be verified.
  - Modifications after submission are strictly prohibited.

## Fairness Measures

- Code will be downloaded and tested from GitHub on competitors' laptops to ensure fairness and verify proper repository usage.

## README Requirements

- Include clear instructions on how to compile and run your code:
  - Specify the programming language and version used.
  - List required packages (e.g., Pandas, NumPy).
  - Any missing specifications will not be assumed to be pre-installed on Director machines.

# Deliverables (Codes) | Produits à fournir (Codes)

## **Algorithm and Output Expectations**

- Your algorithm must:
  - Detect brain tumors in the provided test images.
  - Output results to a file (e.g., Excel or Google Sheets).

## **Training Requirements:**

- Models must be trained within the allotted time or include pre-training instructions in the README.

# Deliverables (Presentations) | Produits à fournir (Présentations)

## Submission Guidelines

- Presentations must be submitted to the **Main branch** of the provided GitHub repository **before the 8-hour deadline**.
- No modifications to the presentation are permitted after the deadline.

## Content Expectations

Your presentation should address the following:

### 1. Ethical Considerations:

- Detail the ethical principles applied during the creation of your code.

### 2. Data Utilization:

- Explain how the provided data was used (e.g., extent of use of all 20,000 images).

### 3. Algorithm Design and Implementation:

- Describe the process and structure of your algorithm.

# Deliverables (Presentations) | Produits à fournir (Présentations)

## **Logistics**

- Presentations will be accessed and opened from the Directors' laptops using the pre-submitted files.
- Last-minute changes or additional work are strictly prohibited.

# Deliverable Submission | Soumission des produits à fournir

- All deliverables must be pushed to your team's MAIN OR MASTER branch on your GitHub repository before 5:30 pm AST.
- Any pushes with timestamps after 5:30 pm will not be taken into consideration.
- Please add @joyaa16 and @OrionWiersma as collaborators to your repository.

# Plagiarism | Plagiat

- All previously written code, code, and code approaches found online, and references must be cited in comments within your code and/or in your presentation.
- All use of AI in any way must be cited! (COME BACK TO THIS AND ADD AN EXAMPLE OF HOW TO CITE AI)



Presentations  
Présentations

# Presentation Order | Ordre des Présentations

- The order of presentations will be posted tomorrow at 8:30 AM MST on the channel on Discord, 30 minutes before the first presentation.
- All teams must be prepared to present when the presentation order is announced.
- Requests to switch presentation orders will be declined to ensure fairness between teams.

# Presentation Rules | Règles des présentations

- Competitors will have a maximum of 20 minutes to present their solutions and demonstrations
- All team members must be present and participate
- Your program and presentation will be run on one of the Directors' machines, using the version submitted on GitHub prior to the deadline on Saturday.
- Judges will have 10 minutes to pose questions afterwards

# Time Warnings | Les Avertissements de Temps

Time is stopped when a question is being answered during the 20 - minute presentation period You will be notified:

- 10 minutes, 5 minutes, and 1 minute before the end of the 20 - minute presentation period.
- A single table knock will be made when there is one minute left.
- There will be a countdown for the last 15 seconds of the presentation.
- Judges and presenters will be given a countdown during the last 30 seconds of the total presentation period.

# Accessibility | Préoccupations de capacité

- If you have any accessibility needs, please inform us as soon as possible
- French presentations will be interpreted by live professional interpreters.

# Room Assignments | Attribution Des Salles

# Questions | Questions

- All questions are encouraged to be posted on the Questions channel on Discord. They will then be translated, and the full question and answer will be posted in both languages for all teams to see within 10 minutes of the question being asked.
- If a question is sent via private message or email, it will not be answered.
- If answering a question is deemed to be unfair or compromises the integrity or spirit of the competition, the question will be posted in English and French with No Comment as the answer.

Thank you! | Merci!

Please do not leave the room until dismissed.

If you have any questions, please send them to the Discord.



# 10-MINUTE QUESTION PERIOD!

- All answers to these questions will be posted on Discord as well!