Travail Pratique Transmédia

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MUS3329X
Projet en Informatique Musicale
February 2026

Université Concordia University

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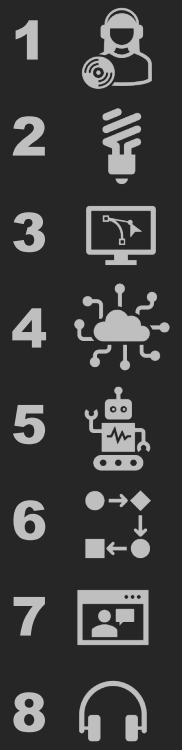


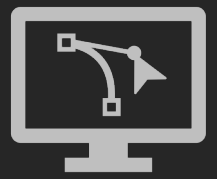
1 ABOUT ME

- ❑ **Bachelor of Engineering – Brazil**
- ❑ **Bachelor of Music in Composition – Canada**
- ❑ **Master’s Candidate at Concordia University:**
  - **My research combines creative practice and technology focusing on machine learning and human-computer interaction in arts creation.**
  - **Currently investigating “embodied knowledge” and LLM co-creation in Uzulangs and live coding environments.**

2 PROJECT IDEA

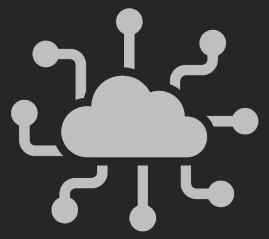
- Live coding performance often requires the performer to remain highly focused on the computer interface.
- This mode of interaction may not fulfil performer's sensation of physical embodiment when compared to instrumental performance (e.g. playing a MIDI keyboard).
- To address embodied interaction, I propose for this project the development of a small neural network that amplifies gestural presence.

3 PYTHON SCRIPT



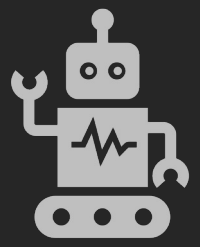
- In live coding performances, performers are typically either standing or seated in front of their computers.
- Since the performer is already positioned in front of the computer, I chose to use the computer's built-in camera as an input device to capture existing body movements.
- For this investigation, I focus on facial expressions that are initially captured through a Python script using MediaPipe as 10 parameters.
- After preliminary testing, these were reduced to three distinct expressive configurations that provide clear positional differentiation: rounded mouth, kiss position, smile (measured bilaterally).

4 MODEL'S DATASET



- The 3 facial expression measurements (normalized between 0–1) serve as the input dataset for the neural network.
- The output consists of 7 values (also normalized), which control parameters across two different 2 VST plugins - OXID and AAS (Applied Acoustics Systems).
- These VSTs receive MIDI input from the Strudel REPL, which the performer uses to control the musical structure in real time.
- Using the defined input/output relationships, a dataset was constructed for training the model. Each data point was adjusted point-by-point to refine mappings and then saved (total of 205 training points).

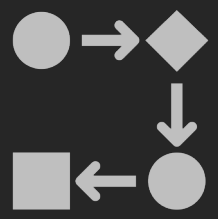
		PARAMETERS							
		Hidden layers	Activation	Output activation	Batch size	Max iter	Learn rate	Validation	Loss
MODEL	1	20 20 20	3	1	1	1000	0,01	0,05	0,005
	2	20 20 20	1	1	10	1000	0,01	0,1	0,025
	3	20 20 20	1	1	10	1000	0,01	0,03	0,029
	4	20 20 20	3	1	10	1000	0,01	0,05	0,019
	5	20 20 20	1	1	5	1000	0,01	0,01	0,021
	6	20 20 20	3	1	3	1000	0,01	0,05	0,099
	7	20 20 20	1	1	3	1000	0,01	0,1	0,031



5 MODEL'S TRAINING

- **Using the same dataset (205 training points), smaller batch sizes produced lower training loss.**
- **Activation 3 (nonlinear) demonstrated better results compared to activation 1 configuration.**

6 MODEL'S REFLECTIONS



- **Larger Dataset: expanding the dataset with more recorded samples would improve model stability and training process.**
- **Reducing Positional Bias: the current model sometimes interprets different head positions as different facial expressions.**
- **Multimodal Comparison: investigate diverse body capture configuration (e.g. upper-body tracking) would allow comparative evaluation of different input modalities and improve mapping accuracy.**

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