Final Project Proposal

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WHAT I LEARNT FROM MY CASE STUDY

1. Scale is very important

2. Understand designer intention

REFLECTION/LIMITATIONS

1. Not considering building shape and floors

2. Degree of angle of solar panels


Music Generation
for music therapy for ASD

REVISED PROBLEM

1. **One percent** of the world has ASD

2. People with ASD usually have a **unique attraction to music** and may have **enhanced musical ability**.

3. Individuals with ASD have **nearly normal abilities** to **recognize**, **experience** and emotional aspects of music

[Ke, X., Song, W., Yang, M., Li, J., & Liu, W. (2022). Effectiveness of music therapy in children with autism spectrum disorder: A systematic review and meta-analysis.

TABLE 2

Study characteristics meeting inclusion criteria.

Study	*n*	Age	Duration	Setting	Control	measure	outcome
Rabeyron (23)	37	4–7 year	8 months, 30 min	MT	Music listening	CGI, CARS, ABC	Lethargy improved
Lim, (16)	50	3–5 year	3 days, 2 times/day	Music training	ST	VPES	No significance
Bieleninik (18)	364	4–6 $\frac{11}{12}$ year	5 months	MT, Standard care	Standard care	ADOS,SRS	No significant difference
Gattino (19)	24	7–12 year	16 weeks	MT, Activities	Activities	CARS-BR	Improve nonverbal communication
Meghan (21)	51	6–12 year	8–12 weeks, 1times/week, 45 min	Music intervention	Non-music intervention	VABS,SRS-II	Improve social communication
Thompson (25)	33	3–6 year	16 weeks, 1 time/week, 30–40 min	MT, Early intervention	Early intervention	VSEEC, SRS-PS	Improve social interactions
Ghasemtabar (10)	27	7–12 year	2 months	MT	No MT	CARS, SRS	Enhance children's social skills
Lim (20)	22	3–5 year	2 weeks, 3 days/week	MT, ABA(VB)	ST ABA (VB)	VPES	No significance

CGI, the Clinical Global Impression; CARS, Childhood Autism Rating Scale; ABC, the Aberrant Behavior Checklist; VPES, A verbal production evaluation scale; ADOS, Autism Diagnostic Observation Schedule; SRS, the Social Responsiveness Scale; VABS, Vineland Adaptive Behavior Scales; VSEEC, Vineland Social-Emotional Early Childhood Scales; ABA, Applied Behavior Analysis; ST, Speech Training.

REVISED PROBLEM

1. ML has been used to retrieve music **by mood** and ML analyses found the personalized approach **more consistent** than a general approach

2. Algorithm learns from a set of **labeled inputs**, generates a model associating the inputs with their respective labels, then **classifies** (or predicts) the likely label for previously **unseen examples** using the learned model.

3. The **Markov chains** are used to generate music while the user wears a **heart-rate** sensor to monitor their **bio-physiological response** to the created music.

4. Tendency in human-computer interaction work to **prioritize the technical implementation** by focusing on **increased speed** or **accuracy of a system**, rather than the specific needs of the application.

Williams, D., Hodge, V. J., & Wu, C.-Y. (2020). On the use of AI for generation of functional music to improve mental health.

REVISED EVALUATION

CONTROL VARIABLE(S)/REQUIREMENTS:

- Recipient of generated music
- Software, method, tool used
- Music specifically for **ASD individuals**

DESIGN VARIABLE(S):

- Speed
- Pitch
- +/- Vocals

REVISED EVALUATION

1

Musical Interface Digital Instrument:

a medium where electronic instruments, computers and other devices can communicate. It allows for control, synchronizing and sequencing of elements

2

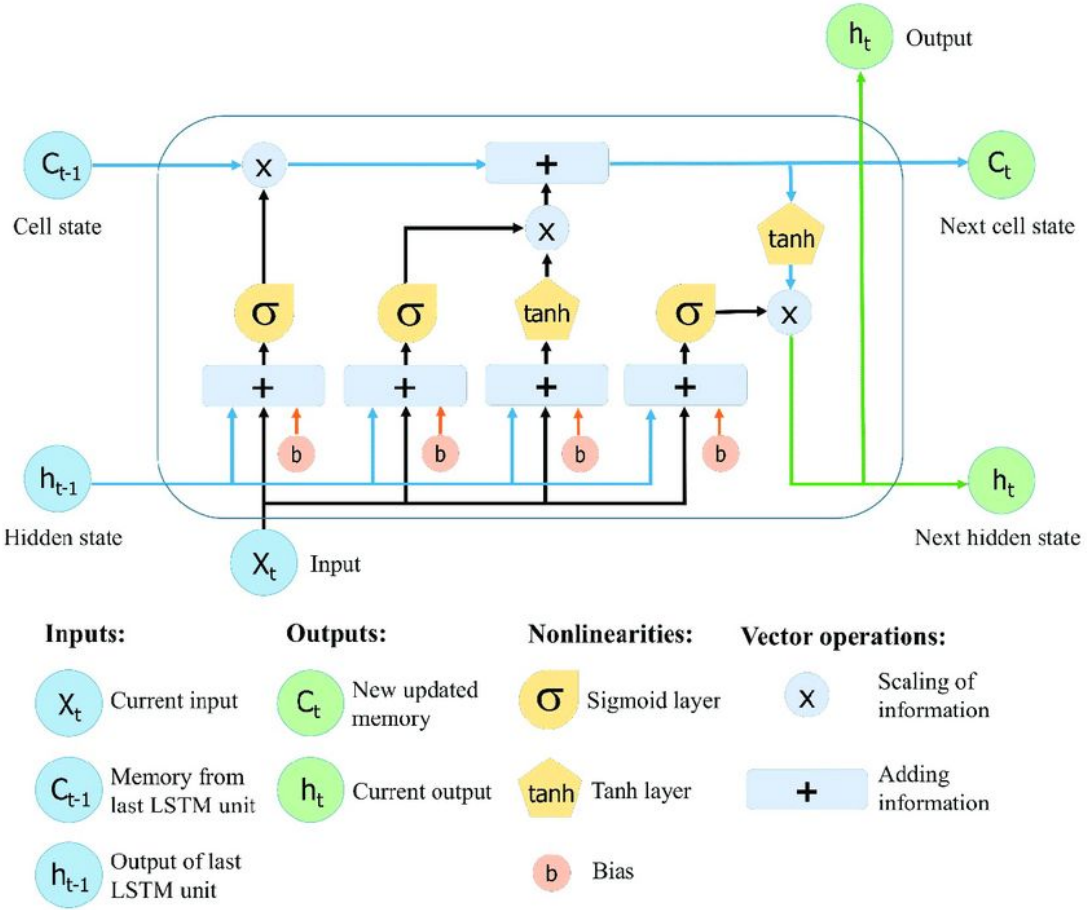
Recurrent Neural Network:

model that is trained to process and convert sequential data input to specific output

3

Long Short Term Memory:

different to regular RNNs as this “remembers” longer and creates a string-like to repeat the information.



Le, Ho, Lee, & Jung. (2019). Application of long short-term memory (LSTM) neural network for flood forecasting. Water, 11(7), 1387. doi:10.3390/w11071387

Rey, A. (2022a). How to generate music using machine learning. Retrieved from https://arturorey.medium.com/how-to-generate-music-using-machine-learning-72360ba4a085

REVISED DESIGN SPACE

PROCESS:

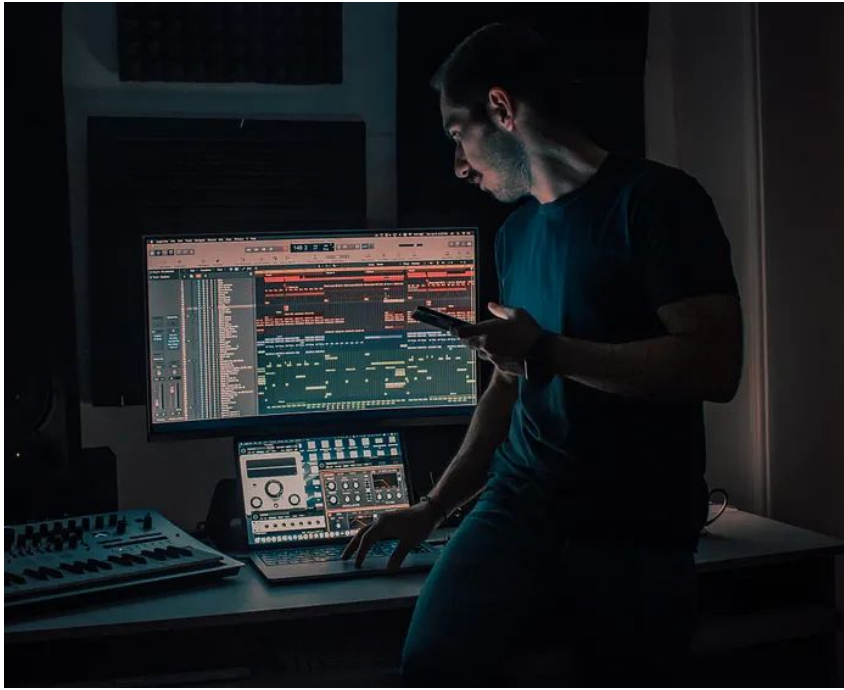
- Collect existing music used for Music Therapy
  - MIDI Files
- Load MIDI Files into memory
- Transform MIDI Files into list of sequenced notes

THINGS TO COLLECT:

- Find a dataset (e.g.: Kaggle)
- Feedback from individual with ASD (verbal or observational)
- Train the network 100+ times for best results

GRASSHOPPER PLUGINS (for visualization):

- Firefly
- Buzz



Rey, A. (2022a). How to generate music using machine learning. Retrieved from https://arturorey.medium.com/how-to-generate-music-using-machine-learning-72360ba4a085

MACHINE LEARNING GENERATED MUSIC

TIMELINE

1 Week of 18/03

- Decide genre of music
- Find dataset
- Experiment with existing scripts online

1 Week of 25/03

- Continue experimenting with different methods
- Create own script

1 Week of 01/04

- Train the network
- Begin generating own music/sound

1 Week of 08/04

- Compare generated music with MT music
- Get feedback from ASD individuals