# Hit Song Science meets GNNs and Neuroscience

## *Supervisor:*

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## Tagline:

*This project aims to develop a graph representation learning framework to predict how popular a song will be given EEG signals recorded while listening to that particular song.*

## Abstract:

Hit Song Science is a field of research that seeks to understand the factors/characteristics that make a piece of music more appealing to the market. This project aims to develop a graph representation learning framework to predict the popularity index (an integer between 0 and 100) of songs in the "*Italian Pop*" genre on the Spotify streaming platform. Such index is computed as the ratio between the number of streams of a particular song and the number of days on Spotify, normalized in a 0-100 range.

In doing so, you will analyze electroencephalogram (EEG) signals recorded with a g.Nautilus device with 32 channels that measured the electrical activity of the brain in a non-invasive method while 27 subjects (13M - 14F between 20 and 30 y.o. ) listened to 20 tracks each (chosen i.i.d. from a batch of 348 tracks) of 30 seconds for a total amount of 540 EEG recordings.

This protocol produced a tensor of shape (540, 32, 7488), which can be interpreted as:

- 540 is the number of samples,
- 32 is the number of channels (nodes of the graph)
- 7488 is the number of time instants (sampled at 250 Hz) (temporal node features)

Moreover, audio features (floats) provided by Spotify can be included in the framework as additional global information.

In this project, you will:

1. Provide a suitable connectivity for each EEG recording.

2. Develop a Temporal GNN to predict if a person's subjective experience listening to a song can reflect its popularity on the song market.

## References:


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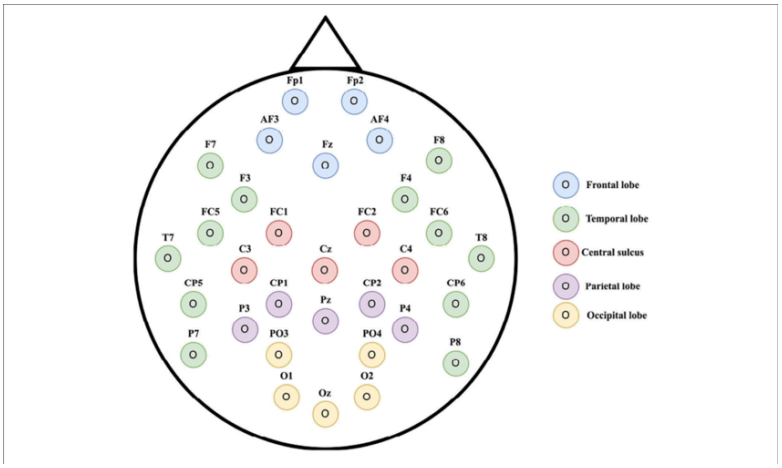
## Useful Links:

EEG sensors chart:



Info on Spotify Audio Features
https://developer.spotify.com/documentation/web-api/reference/get-audio-features

g.Nautilus Pro EEG recording specs:
https://www.gtec.at/product/gnautilus-pro/

Temporal GNNs in Pytorch
https://pytorch-geometric-temporal.readthedocs.io/en/latest/index.html

Temporal Graph Network
https://arxiv.org/abs/2006.10637 – https://github.com/twitter-research/tgn