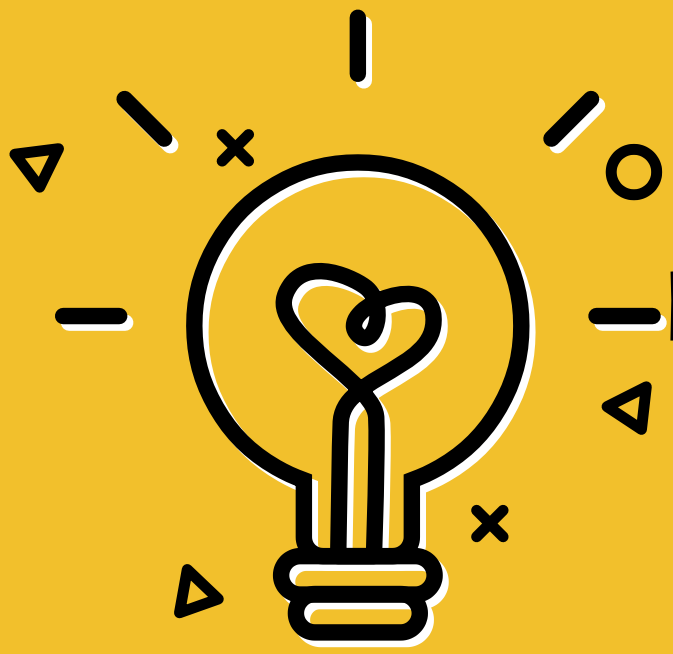


presentation on internship

Sajjad Shaffaf

Borna Abzar Tous

Dependable Distributed Embedded Systems (DDEmS) Laboratory

summer-2023

General Information

Intern

Sajjad Shaffaf

Major: computer engineering

University Entry Year : 2019

Interests: Machine learning- Hardware

Location

DDEmS Laboratory

Faculty of Engineering

D2 hall, Technology Unit 7

Internship subject: Iranian music genre classification

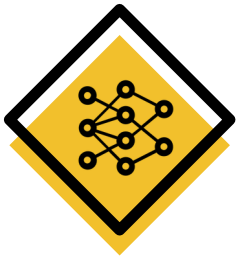
Stages

Testing model

- Testing model through microphone

Improvement

- Inception model implementation
- Data augmentation

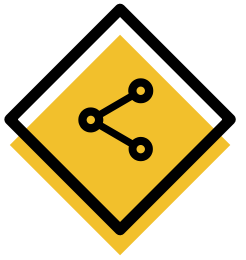


Model implementation

- Model Implementation
- Model tuning
- Visualization and analysis

Data Preprocessing

- Proper foldering (Dastgah-Avaz)
- Removing human voice
- Window extraction
- Data representation (MFCC)



Preparation

- Familiarization with the workspace
- Goal review and planning
- Reading related papers
- Check similar implementations

Data Preprocessing (1)

Albums

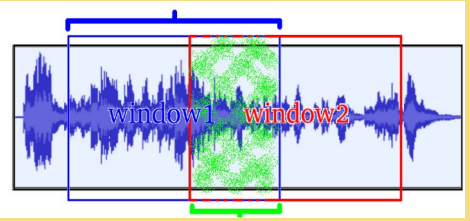
- **Setar:**
  - Hossein Alizzadeh-Mirza Abdullah
- **Tar**
  - Arshad Tahmasebi-Mahmoud Karimi
  - Hossein Alizzadeh-Mirza Abdullah

Classes (genres)

- **7 Dastgah:**
  - Shur, Segah, Rastpanjgah, Nava, Mahoor, Homayun, Chahargah
- **6 Avaz:**
  - Dashti, Bayat-E Tork, Bayat-E Kord, Bayat-e Esfahan, Afshari, Abuata

Window extraction

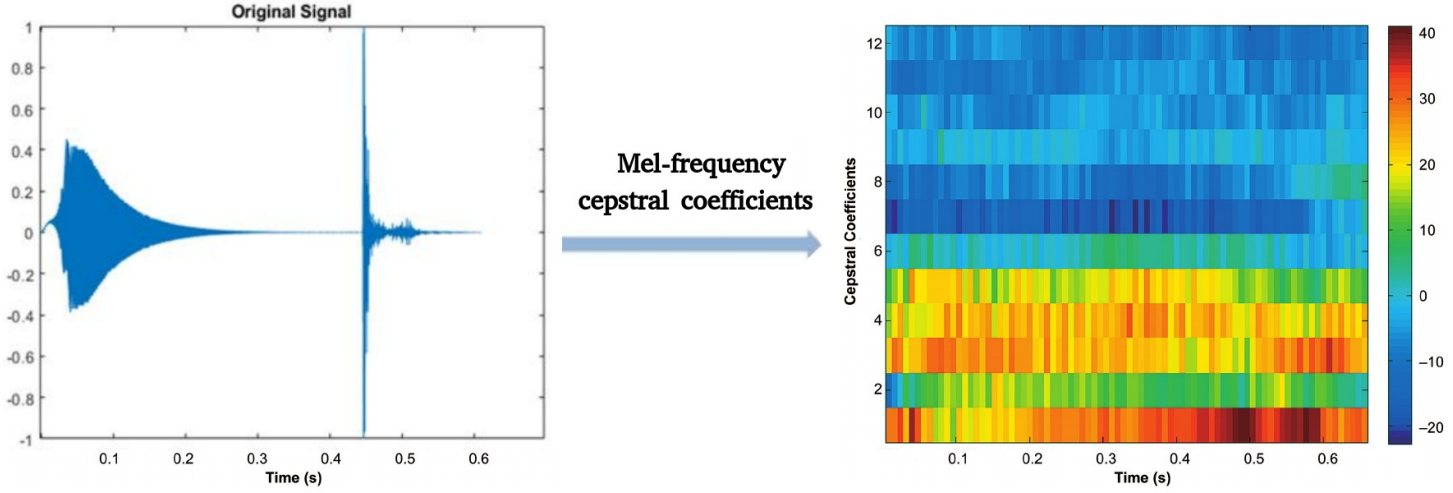
- **Window size**
- **Overlap**



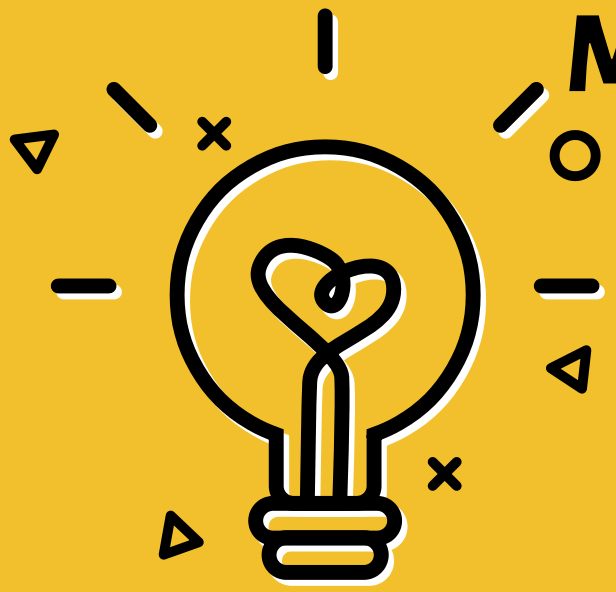
Popper representation

- Reduce the model complexity
- Increase the speed of the model
- Accuracy improvements (in some cases)

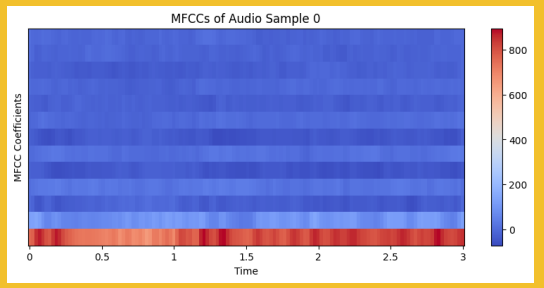
Mel–frequency cepstral coefficients



Model Implementation



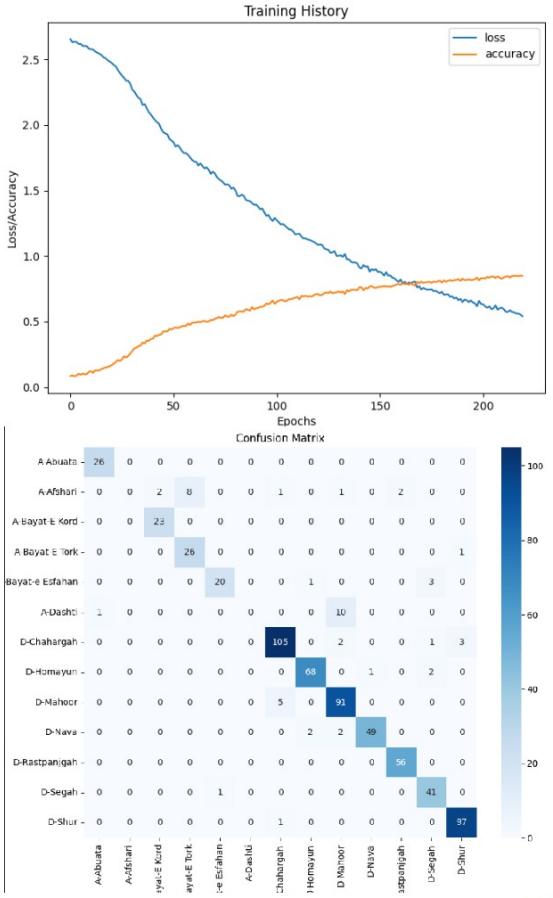
- **Seven CNN block, each with:**
  - 1x Convolution layer
  - 1x Batch normalization layer
  - 1x Dropout layer
- **One fully connected layer**



Genre Classification Model

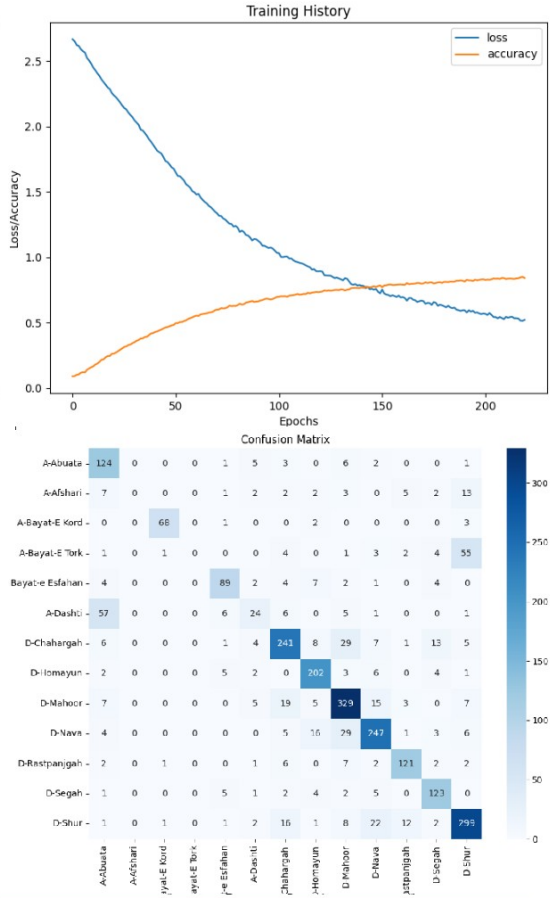
Genre

Model evaluation



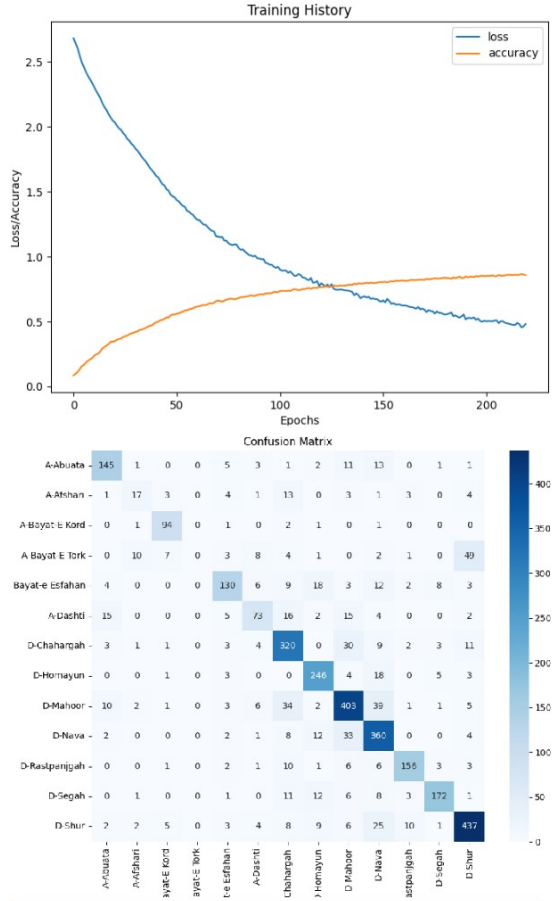
dataset 1

window size : 10
overlap : 5
train size : 2605
test size : 652
train acc : 0.95
test acc : 0.92



dataset 5

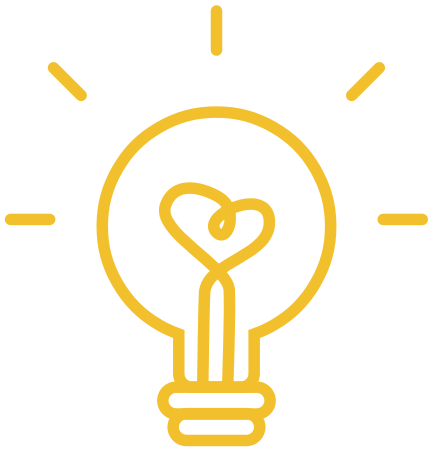
window size : 4
overlap : 0
train size : 9718
test size : 2430
train acc : 0.92
test acc : 0.76



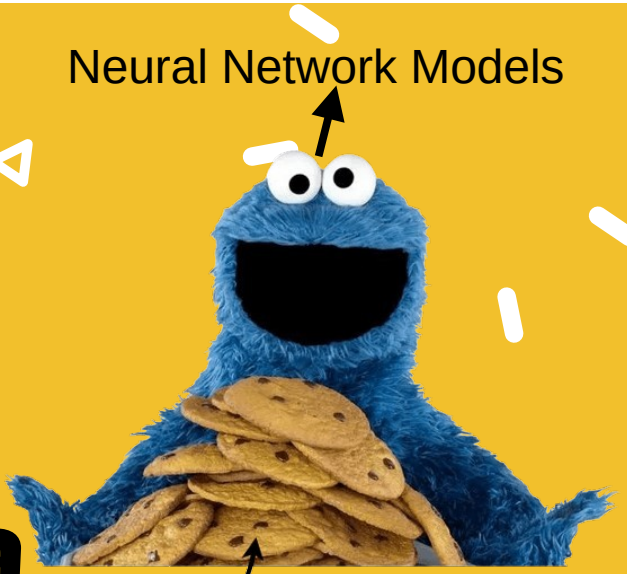
dataset 8

window size : 3
overlap : 0
train size : 13024
test size : 3257
train acc : 0.95
test acc : 0.78

Challenges



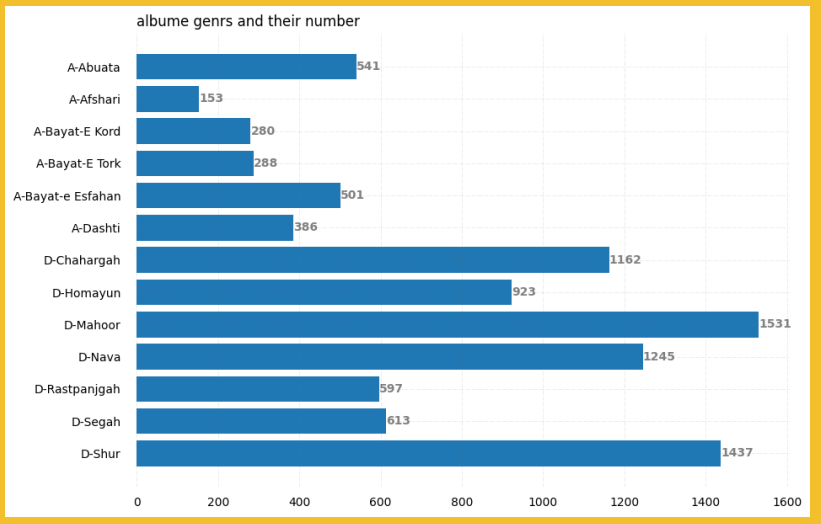
1 Lack of data



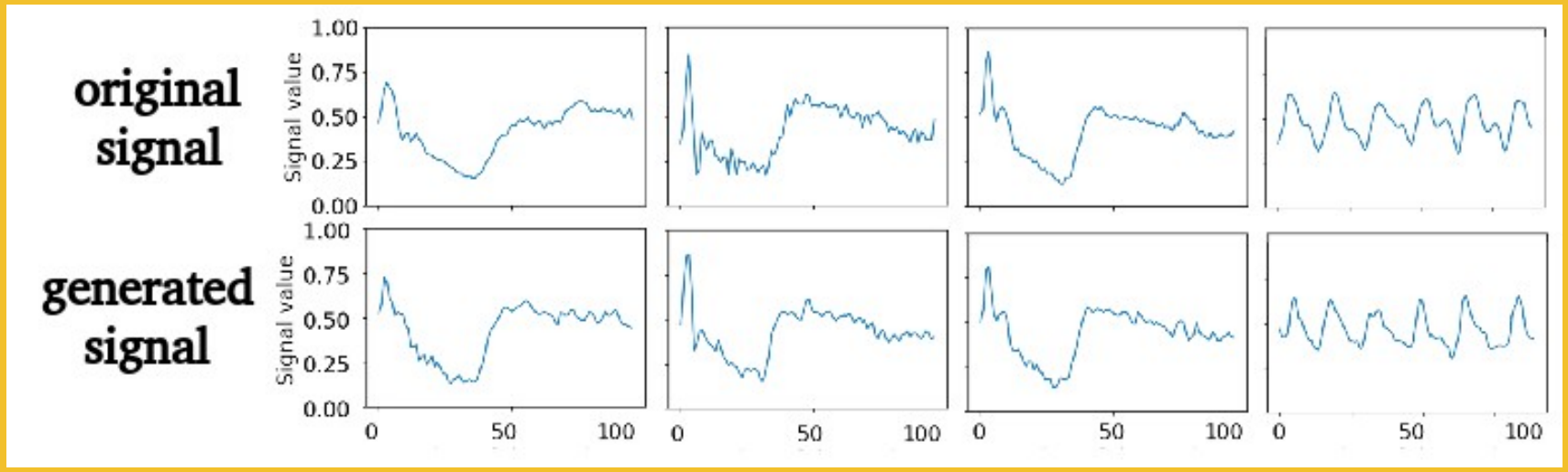
Data

window size	: 8
overlap	: 0
sampling rate	: 22050
number of all mp3 files	: 604
number of all windows extracted	:5928

2 Imbalanced Data

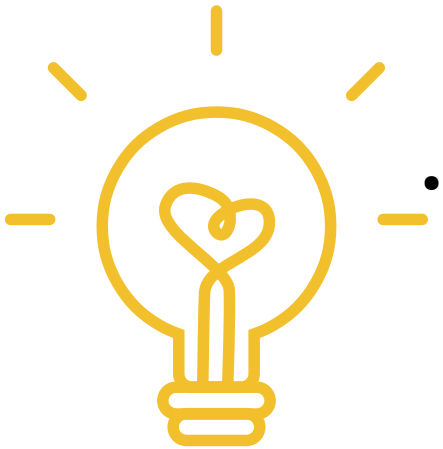


Data augmentation



New Challenges

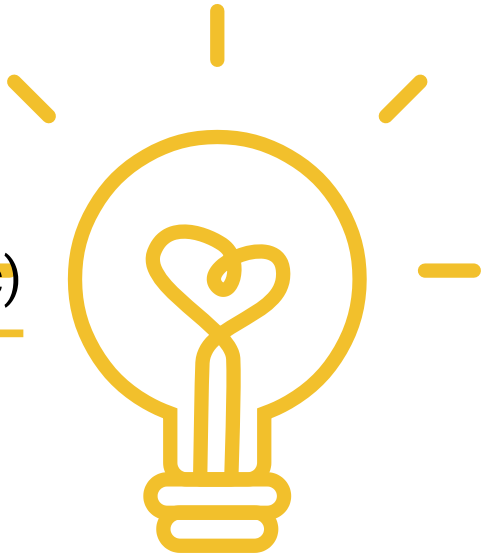
- The need for a More RAM



- The need for more powerful hardware to train the model

Application

- Music Recommendation System
  - Automatic sorting of music by genre
- Creating music playlists for radio and...
  - Video classification (according to its music)
- preparing suitable materials for music students



References

Steffen Schneider, Alexei Baevski, Ronan Collobert, Michael Auli, Sep 2019 , wav2vec: Unsupervised Pre-training for Speech Recognition

Ashish Vaswani, Noam Shazeer, Niki Parmar, Jakob Uszkoreit, Llion Jones, Aidan N. Gomez, Lukasz Kaiser, Illia Polosukhin, Aug 2023, Attention Is All You Need

sahil poonia, chetan verma, Nikita Malik, August 2022, Music Genre Classification using Machine Learning: A Comparative Study

Christian Szegedy, Wei Liu, Yangqing Jia, Pierre Sermanet, Scott Reed, Dragomir Anguelov, Dumitru Erhan, Vincent Vanhoucke, Andrew Rabinovich, Sep 2014, Going Deeper with Convolutions

THANK YOU

- **Contacts:**
  - **Email:** sajadshafafq@gmail.com
  - **Linkedin:** sajjad-shaffaf
  - **Telegram:** YourSenpaiiii