COMP 424 - Winter 2012
Final Project

Due Date: April 16

Introduction

The goal of the project is to identify the genre of music tracks based on auditory features. You will be given pitch and timbre information about music pieces along with a training set of labelled tracks. Your task includes selecting and extracting relevant features from these and building a supervised classifier for genre prediction.

Project Homepage

All the resources (including the project datasets) are provided here:
`http://cs.mcgill.ca/~mmilan1/ai/`

Dataset Description

The dataset for this project is a pre-processed subset of the *Million Song Dataset* (`http://labrosa.ee.columbia.edu/millionsong/`). It contains three files:

- `trainx.txt` contains the features of the training set, one line per track.

- `trainy.csv` contains the genre id for the tracks in the training set.

- `traininfo.csv` contains track ids and track names (not needed).

- `testx.txt` contains the features of the testing set, one line per track.

Your task is to generate the file `testy.csv`, containing the genre predictions for the tracks in the testing set.

Features Description

The features consist of the results of auditory analysis on 200 small segments of a music track. For each segment we get 25 real-valued features:

- `volume` of the segment

- 12 `pitch` features, indicating the magnitude of musical notes in a segment

- 12 `timbre` features, indicating different *qualities* of the sound[1]

The feature set for each music track is the concatenation of the features of the segments, ordered by the segment id (superscript):

$\texttt{vol}^1\ \texttt{pitch}^1_1\ \texttt{pitch}^1_2\ \ldots\ \texttt{pitch}^1_{12}\ \texttt{tibmre}^1_1\ \texttt{tibmre}^1_2\ \ldots\ \texttt{tibmre}^1_{12}\ \texttt{vol}^2\ \ldots$

In homework 5, you were given the sum of the 25 features over all the segments instead of the full list.

Submission Instructions

You should submit three components (detailed below). These components are mandatory in order to receive a passing grade on the project. All should be submitted on the due date.

- A written report documenting your approach (submit this in class).

- Your prediction file `testy.csv` (upload using the Kaggle website).

- Your code (upload using the project homepage).

Report

The report must be typed and grammatically sound. The suggested length is 5 pages (∼300 words per page), but the most important part is to produce a report that is clear and concise. The report must include the following required components:

- An introduction describing the overall problem, and summarizing your approach. (1/2 page)

- A methods section describing your AI approach. It is important to explain both *what* you did, and *why* you did it. You can also include techniques that were tried, but are not used in the final version. (2-3 pages)

- A validation section describing how you tested and evaluated your approach during the development. (1 page)

- A summary of the advantages and disadvantages of your approach, expected failure modes, or weaknesses of your program. (1 page)

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[1]Timbre is the quality of a musical note or sound that distinguishes different types of musical instruments, or voices. It is a complex notion also referred to as sound color, texture, or tone quality, and is derived from the shape of a segment's spectro-temporal surface, independently of pitch and loudness. (See *The Echo Nest - Analyzer Documentation*)

- A description of how you would improve your program. (1/2 page)

- References for any material (incl. software, papers) used in the preparation of your code or report. Any referencing style is ok, but provide full information.

You must hand in your report in the class by the deadline. Please do not submit excessively long reports.

Prediction File

Generate a file `testy.csv` in which each line is your guess of the genre id of tracks in `testx.txt` (pop:0, jazz:1, metal:2, techno:3, classical:4). The formatting should be similar to the `trainy.csv` file.

To submit your file:

- If you did not do this for homework 5, create an account on the Kaggel website (`http://inclass.kaggle.com/`) using your McGill email. Your email must end with `mcgill.ca` in order to submit your answer.

- Locate the "COMP 424, Final Project" in the competitions:
  `http://inclass.kaggle.com/c/comp-424-final-project`
  Click on "Make a submission" and upload your output file.
  You can upload up to 10 times a day.

- **Important:** Your Kaggle team name *must* be your first and last name.

Kaggle will calculate the correct classification rate based on 50% of the test data and rank you among other submissions on a public score board. The top 20 students on the final score board (based on the entire dataset) will get extra bonus points. You will be graded based on the final ranking on Kaggle.

Code

It is mandatory that you have a working and documented program. Programs that are not working will not receive credit. Programs that are not documented will not receive full credit. Your implementation can be carried out in the programming language of your choice. Submit your code in a single `McGill-ID.zip` (e.g. `123456789.zip`) file using the upload link on the project homepage. Do not email your code.

Academic integrity

This is an individual project. The exchange of ideas regarding the prediction task is encouraged, but sharing of code and reports is forbidden and will be treated as cheating. Please see the syllabus and `http://www.mcgill.ca/integrity` for more information.