Emotion Detection in Song Lyrics Stanzas

TEXT ANALYTICS

Group 2

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List of figures

Introduction

This report illustrates development and findings of Group 2's project for the course Text Analytics, Academic Year 2024-2025.

Motivation and project goal

This project's goal is the development of various Machine Learning models that perform emotion detection on songs' lyrics.

The emotional tone of songs can be useful for many things, such as automatized playlist creation, or songs' organization, offering an alternative to the more traditional genre-based classification.

To obtain a deeper understanding of emotional fluctuations within the texts, the models assign emotion labels to individual stanzas instead of full songs. The emotional classification is based on Robert Plutchik's eight primary emotions (shown in figure 1), offering a comprehensive range for representing diverse emotional states.

Figura 1: Plutchik's eight primary emotions

Dataset overview

The dataset used in this project represents a sampled subset of songs derived from the Genius Song Lyrics Dataset[geniusdataset]. The original dataset (3m records) included songs in many different languages; however, this work focused exclusively on English-language songs. The original dataset contained numerous attributes, but the ones considered relevant for model training are:

- **title:** the song's title;
- **lemmatized_stanzas:** lyrics of the single stanza;
- **stanza_number:** identifies the position of the stanza in the song;
- **is_chorus:** boolean variable that attests whether the stanza is a chorus;
- **tag:** represents the genre of the song. for easier handling, it is split into boolean attributes (is_country, is_pop, is_rap, is_rb, is_rock);
- **label:** represents the emotional classification of the stanza, assigned by Albert Base v2[albert-base-v2] model.

Due to limited computational power, the labeling process was time-intensive, ultimately resulting in a limited dataset **(QUANTE? AGGIUNGEREI NUMERO STROFE)**.

1. Preprocessing

The first step in the preprocessing phase involved sampling the original dataset while preserving the original proportions of the different genres. This ensured that the genre distribution in the subset remained representative of the full dataset.

2. Static Models

2.1 Random Forest

2.2 SVM

3. Neural Networks

3.1 One-Dimensional Convolutional Neural Network

3.2 Recurrent Neural Network

Key findings and conclusions