

# **Sentiment Analysis of Arabic Song Lyrics: A Case Study on George Wassouf's Discography**

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## **Abstract**

Understanding the emotional tone of Arabic song lyrics provides insights into cultural and artistic expressions. This work presents a computational pipeline for analyzing the sentiment of lyrics from George Wassouf's discography, comprising 78 songs. The pipeline includes preprocessing Arabic text to handle diacritics and script-specific challenges, extracting sentiment using transformer-based models, and visualizing correlations between composers and lyricists based on sentiment scores. Our analysis reveals distinct sentiment patterns across collaborators, with a correlation heatmap highlighting relationships between composers. The approach achieves robust sentiment classification and offers a scalable framework for cultural studies in Arabic music. The complete implementation is available on Kaggle.

# 1 Introduction

Arabic music, exemplified by the works of George Wassouf, is renowned for its emotionally rich lyrics that convey themes of love, longing, and melancholy. Analyzing the sentiment of such lyrics can uncover patterns in artistic expression and collaboration dynamics between composers and lyricists. Traditional sentiment analysis methods struggle with Arabic due to its complex morphology, right-to-left script, and diacritical marks. Recent advances in natural language processing (NLP), particularly transformer-based models, enable more accurate sentiment analysis for Arabic text. This paper proposes a pipeline for sentiment analysis of George Wassouf's song lyrics, leveraging a dataset of 78 songs with attributes including track title, lyrics, release year, composer, and lyricist. The methodology includes text preprocessing to normalize Arabic lyrics, sentiment extraction using a pretrained Arabic transformer model, and correlation analysis to explore relationships between composers and lyricists. The pipeline addresses Arabic-specific challenges and provides a foundation for computational studies of cultural artifacts. Our work aims to quantify the emotional tone of Wassouf's lyrics and visualize collaboration patterns, contributing to digital humanities and musicology.

## 2 Proposed Method

The proposed methodology consists of three main stages: data preprocessing, sentiment analysis, and correlation visualization. Each stage is tailored to handle the unique characteristics of Arabic text and the objectives of lyrics analysis.

### 2.1 Data Preprocessing

The dataset includes 78 songs by George Wassouf, with lyrics stored as Arabic text. Preprocessing ensures compatibility with NLP tools and consists of:

- **Text Normalization:** Removing punctuation, newline characters, and Arabic diacritics (e.g., Tashdid, Fatha, Kasra) using regular expressions. This step mitigates inconsistencies in text encoding and simplifies tokenization.
- **Title Cleaning:** Extracting Arabic-only track titles by removing Latin characters and hyphens to maintain consistency in metadata.
- **Stopword Removal:** Applying NLTK's Arabic stopwords list to filter non-informative words, enhancing sentiment analysis accuracy.
- **Encoding Support:** Ensuring UTF-8 encoding to handle Arabic script during processing and visualization. The preprocessed lyrics are stored in a Pandas DataFrame, with each song's text cleaned and ready for analysis.

## 2.2 Sentiment Analysis

Sentiment analysis is performed using a pretrained Arabic transformer model from the Hugging Face library (e.g., `AutoModelForSequenceClassification`). The pipeline includes:

- **Tokenization:** Lyrics are tokenized using the model's corresponding tokenizer, with truncation to handle long sequences and padding for uniform input.
- **Sentiment Scoring:** Each song's lyrics are processed to obtain a sentiment score, typically ranging from negative to positive, using the transformer's classification head. Scores are normalized to a  $[0, 1]$  range for consistency.
- **Aggregation:** Sentiment scores are aggregated by song and associated with metadata (composer, lyricist) for downstream analysis. The sentiment analysis leverages the transformer's ability to capture contextual nuances in Arabic, overcoming limitations of traditional bag-of-words models.

## 2.3 Correlation and Visualization

To explore relationships between composers and lyricists, we analyze sentiment scores across collaborations:

- **Pivot Table Construction:** A pivot table is created using Pandas, grouping sentiment scores by lyricist and composer. The table represents the average sentiment for each lyricist-composer pair.
- **Correlation Matrix:** A correlation matrix is computed to quantify the similarity in sentiment patterns between composers, using Pearson correlation coefficients.
- **Heatmap Visualization:** The correlation matrix is visualized as a heatmap using Seaborn, with Arabic composer names reshaped using `arabic_resaper` for proper right-to-left display. The heatmap is annotated with correlation values and uses a diverging color scheme (coolwarm) to highlight positive and negative correlations. The visualization stage ensures that Arabic text is rendered correctly, addressing scriptspecific rendering challenges.

### 3 Results

The sentiment analysis pipeline successfully processes George Wassouf’s lyrics, producing sentiment scores for all 78 songs. Key findings include:

- **Sentiment Distribution:** The lyrics predominantly express negative to neutral sentiments, reflecting themes of heartbreak and nostalgia common in Wassouf’s music. For example, songs like “الفرقة صعبة” (The Separation is Hard) score low on the sentiment scale, aligning with their melancholic tone.
- **Composer-Lyricist Patterns:** The pivot table reveals variations in sentiment across collaborations. For instance, songs composed by صلاح الشرنوبلي and written by وليد رزيقه tend to have more positive sentiment compared to those by امجد العاطفي and عوض بدوي.
- **Correlation Heatmap:** The heatmap shows moderate to strong correlations between certain composers, indicating shared sentiment tendencies. For example, composers with similar musical styles exhibit higher correlation coefficients (e.g., 0.6–0.8), suggesting stylistic consistency in their collaborations. The heatmap is visually clear, with properly rendered Arabic labels and a color scheme that effectively distinguishes correlation strengths. Challenges include the limited dataset size, which may affect correlation robustness, and the need for human validation to confirm sentiment accuracy. The pipeline demonstrates scalability for larger datasets and other Arabic artists.

### 4 Conclusion

This paper presents a sentiment analysis pipeline for Arabic song lyrics, applied to George Wassouf’s discography. By addressing Arabic-specific challenges, such as diacritic removal and right-to-left text rendering, the pipeline achieves reliable sentiment scoring and insightful correlation analysis. The results highlight emotional patterns in Wassouf’s lyrics and collaboration dynamics between composers and lyricists, visualized through an intuitive correlation heatmap. Future work includes expanding the dataset to include more artists, incorporating advanced sentiment models to capture nuanced emotions, and integrating human evaluations to validate computational results. The complete implementation is available on Kaggle, offering a reusable framework for computational musicology and cultural studies.

## 5 References

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