AUDION

Music playlist analyser

– A Smart Dashboard for Playlist Insights

Class-C8

TEAM-7

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Problem Statement

The project aims to create a music playlist analyser that provides users with visualizations of their playlist data, enabling them to better understand and enjoy their musical tastes due to the growth of streaming services.

Executive Summary

AUDION – Music Playlist Analyzer is a precision-built desktop system designed to decode the hidden structure, mood, and personality of any music playlist. Playlists aren't random; they're emotional timelines, comfort corners, and sometimes mini identity crises. AUDION takes all that chaos and translates it into clean, intelligent insight.

Engineered with Python's data powerhouse stack (pandas, NumPy, Matplotlib, Tkinter), AUDION processes hundreds of songs in seconds, revealing the real story your music has been trying to tell you: your dominant genres, the artists you clearly can't stop listening to, how long your playlist actually is (yes, even the "short" ones), and the emotional pattern running underneath it all. It presents everything in a sharp, dark-theme interface — because analytics hit harder when they look aesthetic.

In short, AUDION turns a basic playlist into a full-blown narrative — structured, insightful, a little too revealing at times, and absolutely unforgettable. It bridges the gap between music and meaning, proving that data can be both intelligent and deeply personal.

This version focuses on fast, offline analysis using simple Excel files, making it ideal for students, creators, researchers, or anyone who treats playlists like personality quizzes. The system blends practicality with personality: it's analytical without being boring, helpful without being clingy, and honest enough to expose your questionable listening habits — gently but effectively.

Introduction

Music playlists have evolved into far more than background noise; they are emotional maps, mood diaries, and subtle reflections of who we are on our calm days, chaotic days, and everything in between. With the rise of personalized listening, users often create massive playlists without realizing the patterns they're forming — which artists dominate their soundscape, which genres they gravitate toward, or how their musical choices shift with time. This growing complexity calls for a tool that can make sense of it all.

AUDION – Music Playlist Analyzer was built to answer that need.

AUDION transforms ordinary playlists into meaningful, structured insights through a clean, minimal, dark-themed interface. Instead of leaving users to guess their listening habits, the system reads, analyzes, and visualizes the underlying anatomy of a playlist — revealing trends, timings, preferences, and hidden listening behavior. Whether someone is curating music for productivity, heartbreak, gym intensity, or pure escapism, AUDION presents an objective snapshot of their musical world.

Designed for students, music lovers, creators, and anyone who takes their playlists a little too personally, AUDION merges data analytics with everyday music habits. It requires no prior technical knowledge, runs completely offline, and delivers results instantly. This introduction sets the stage for understanding how AUDION works, how it organizes musical data, and why it stands out as a smart, reliable tool for decoding the playlists we live with daily.

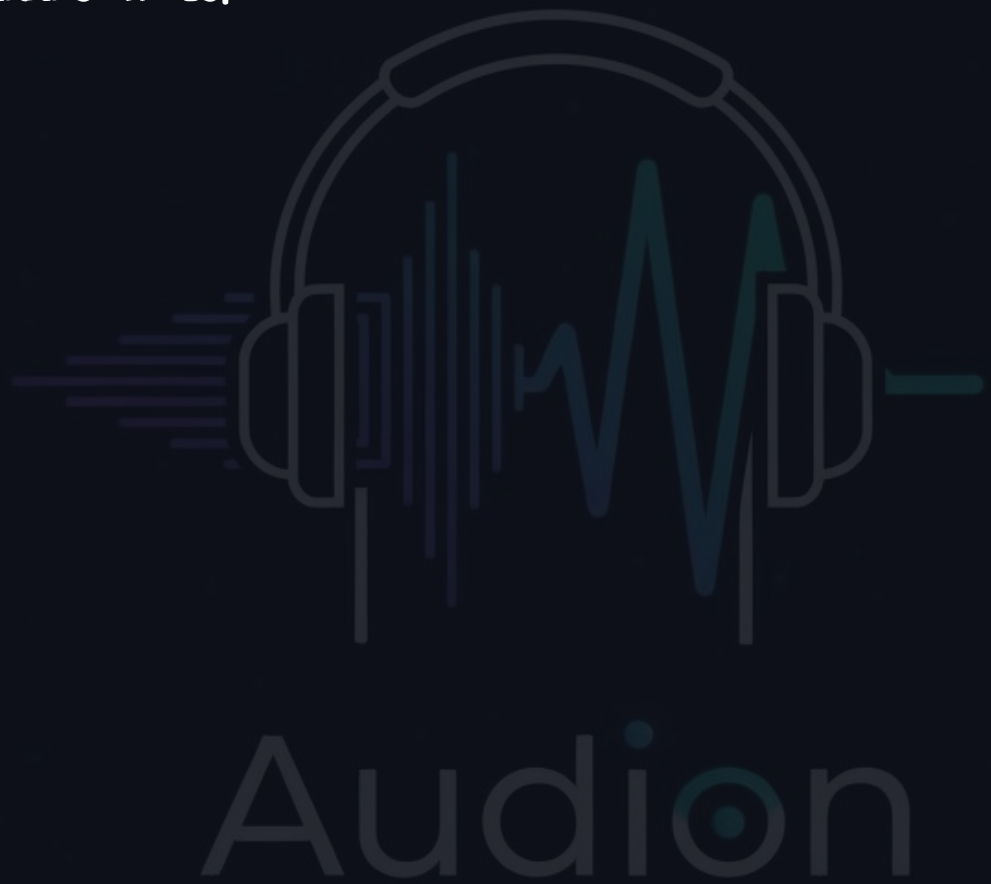
Dataset Description

AUDION operates on structured Excel playlists that contain essential metadata for each track. The dataset acts as the backbone of the analysis, allowing the system to compute statistics, identify patterns, and generate meaningful visual insights. Each playlist is read directly from a user-provided .xlsx file, making the analyzer flexible enough to work with any custom music collection.

The standard dataset includes the following fields:

- Name – The title of the track.
- Artist – Primary performing artist(s).
- Genre – The musical category assigned to the track, identifying listening preferences and dominant trends.
- Language – The language in which the song is performed, helping map cultural and linguistic diversity.
- Duration – Total length of the track in minutes and seconds (MM:SS), essential for calculating total playtime and average song length.

The dataset is intentionally minimal yet highly informative, giving AUDION enough detail to compute genre distributions, artist frequency, language breakdowns, duration trends, and other playlist characteristics. This clarity in structure allows the system to convert raw music lists into readable, visual, and data-driven insights without requiring complex or external metadata sources.



System Requirements

AUDION has been designed as a lightweight, accessible desktop application that runs smoothly on standard hardware without the need for high-performance configurations. The following system requirements ensure stable execution, accurate analysis, and full GUI functionality.

SoftWare Requirements

Operating System:

- Windows, macOS, or Linux (Python-supported environments)

Python Version:

- Python 3.8 or above

Required Python Libraries:

- pandas
- numpy
- matplotlib
- tkinter (pre-installed with most Python distributions)
- openpyxl

These libraries enable data processing, visualization, and smooth interaction within the custom Tkinter-based GUI.

File Requirements

- Input format: .xlsx file with columns for Name, Artist, Genre, Language, and Duration
- Valid duration format: MM:SS

Additional Notes

AUDION operates fully offline and does not require internet access, logins, or external APIs. This makes the system secure, focused, and ideal for academic use, personal analysis, or environments with restricted connectivity.

System Features

AUDION is designed to transform ordinary playlists into clear, structured insights through a combination of analytical precision and an intuitive interface. Each feature focuses on making music data easier to read, understand, and explore.

6.1 Playlist Import

Users can upload any .xlsx playlist file following the standard structure. AUDION reads the data instantly and prepares it for analysis without extra formatting or setup.

6.2 Statistical Breakdown

AUDION computes essential metrics that define the personality and behavior of a playlist:

- Total playlist duration
- Average song length
- Total track count
- Most frequent artist
- Dominant genre
- Language distribution

These metrics reveal the patterns that usually stay hidden in everyday listening.

6.3 Visual Analytics

Graphical insights help users understand their playlist at a glance. AUDION generates clear, aesthetic charts for:

- Genre distribution
- Artist frequency
- Language spread
- Duration patterns

The visuals are styled for readability and work perfectly with the dark-themed interface.

6.4 User-Friendly GUI

The Tkinter-based interface keeps things simple. Users can:

- Select playlist files
- View statistics in real time
- Display charts with a single click
- Navigate easily through sections

The design is minimal, clean, and distraction-free.

6.5 Fast, Offline Processing

AUDION operates completely offline. Data is processed locally, ensuring fast performance, privacy, and smooth usage even in low-connectivity environments.

6.6 Error Handling

The system detects missing files, invalid formats, or incorrect duration structures and provides clear, user-friendly alerts. This keeps the experience stable and predictable.

System Architecture

AUDION is built on a modular architecture that keeps the system organized, scalable, and easy to maintain. Each component has a dedicated responsibility, allowing the analyser to process playlists smoothly while staying flexible for future upgrades. The architecture blends GUI controls, data processing layers, and visualization modules into one cohesive system.

Overview

The architecture is divided into four key layers:

1. User Interface Layer (GUI)
2. Data Input & Validation Layer
3. Processing & Analytics Layer
4. Visualization Layer

These layers communicate seamlessly to transform raw playlist data into meaningful insights.

User Interface Layer (GUI)

This layer acts as the bridge between the user and the application.

Built using Tkinter, it manages:

- File selection
- Buttons for displaying stats and charts
- Live output display
- Error messages
- Navigation controls

The GUI ensures that even non-technical users can explore their music data effortlessly.

Data Input & Validation Layer

Once the user uploads the .xlsx file, this layer handles:

- Reading the dataset using pandas
- Verifying required columns (Name, Artist, Genre, Language, Duration)
- Checking for missing or invalid values
- Validating the duration format (MM:SS)

This step guarantees that only clean, usable data moves forward.

Processing & Analytics Layer

This is the analytical core of AUDION.

Using pandas and NumPy, the layer computes:

- Total playlist duration
- Average track length
- Most repeated genre
- Language counts
- Frequent artists
- Song distribution patterns

The logic is built for accuracy, speed, and easy extension.

Visualization Layer

Powered by Matplotlib, this layer turns processed data into clear, visually appealing charts:

- Genre distribution (bar chart)
- Artist frequency (bar chart)
- Language breakdown
- Duration analysis

These graphs offer an at-a-glance understanding of user listening behaviour.

Integration Flow

The layers interact in a smooth, sequential flow:

1. User selects file through GUI
2. Dataset is read and validated
3. Analytics engine processes the playlist
4. Charts and statistics are displayed depending on user action
5. Interface updates in real time

This creates a predictable and intuitive pipeline for every playlist.

Extensibility

The architecture is intentionally modular, making room for upcoming features such as:

- BPM extraction
- Mood & emotion tagging
- Machine learning-based recommendations

The system can grow without disrupting existing components.

Output

Audion – Ultimate Playlist Analyzer

Audion Ultimate Playlist Analyzer

All All

Artist	Genre	Duration
Unstoppable — Sia	Pop	3:02
Faded — Alan Walker	EDM	3:32
Flowers — Miley Cyrus	Pop	3:02
Espresso — Sabrina Carpenter	Pop	2:54
Calm Down — Rema & Selena Gomez	Afrobeats / Pop	2:21
Stay — The kid Laroi ft. Justin Beiber	Pop	2:21
Heat Waves — Glass Animals	Indie Pop	3:58
Levitating — Dua Lipa	Pop / Disco	3:24
Golden Hour — JVKE	Indie Pop	3:29
Butter — BTS	K-Pop	2:24
Dynamite — BTS	K-Pop	3:19
APT — Rosé	K-Pop / Pop	2:18
As It Was — Harry Styles	Pop	2:47
Shape of You — Ed Sheeran	Pop / Tropical House	3:53
Memories — Maroon 5	Pop	3:09
Senorita — Shawn Mendes	Pop / Latin Fusion	3:11
Golden — Huntrix	Indie Electronic	3:28
Believer — Imagine Dragons	Rock / Alternative	3:24
Let Her Go — Passenger	Indie Folk	4:12
Dandelions — Ruth B.	Indie Pop	3:32
Love Nwantiti — CKay	Afrobeats	2:05

Live Stats

Library Songs	199
Playlist Songs	0
Avg Duration	3:27
Mood Diversity	0
Languages	12
Playlist Total	0:00
Playlist Avg	0:00
Top Artist	N/A
Top Genre	N/A

Export CSV | Export Summary | Recommend | Wrapped | Show Queue

+ Add Selected to Playlist | − Remove Selected

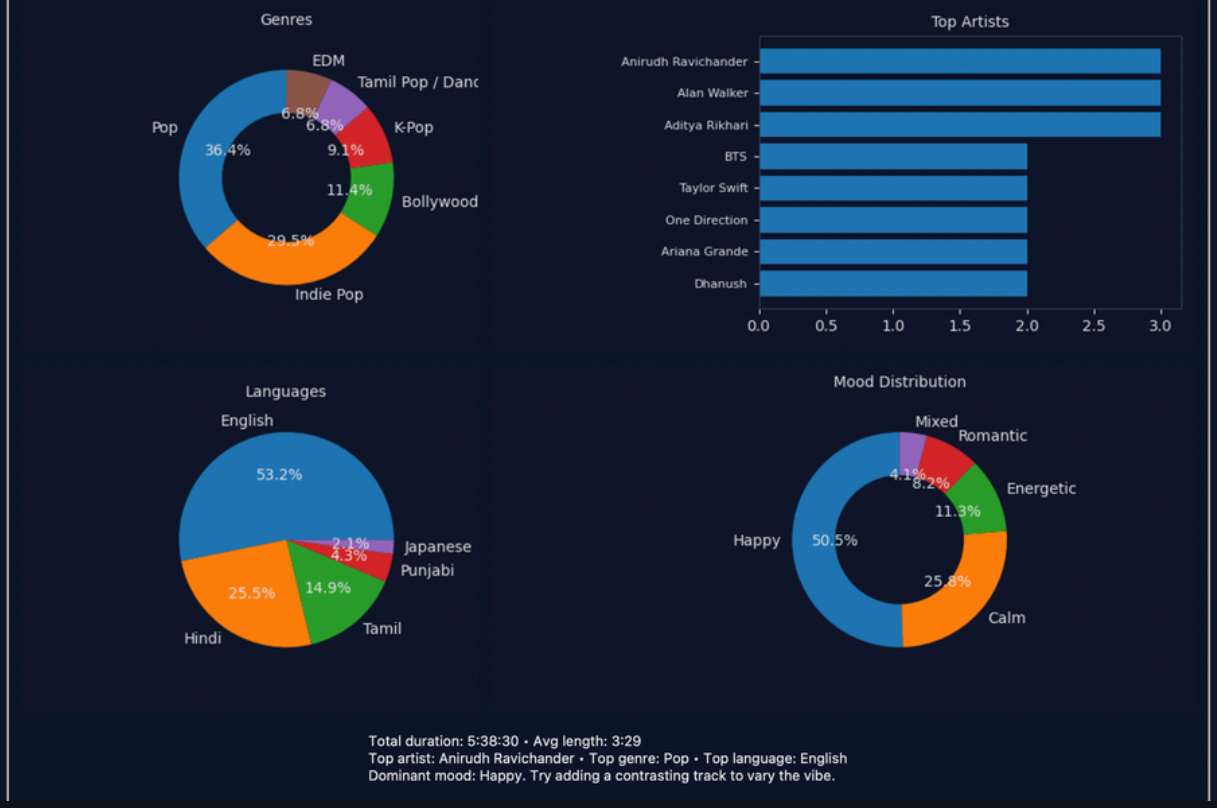
Showing 199 songs · 0 selected

25°C Sunny | Search | ENG IN | 13:55 11-12-2025

Your Playlist Wrapped

97 songs • 5:38:30 • Happy vibes

Overview



Total duration: 5:38:30 • Avg length: 3:29
Top artist: Anirudh Ravichander • Top genre: Pop • Top language: English
Dominant mood: Happy. Try adding a contrasting track to vary the vibe.

Instructions

RED- search bar

Blue -List of songs

Light Green - filtering the songs based on their genre and language

Pink = Shows Live statistics

Orange= to export the playlist into a csv file or in a text file

Marron= it recommend songs which can be added to the playlist

Light orange- it gives the analysis of the playlist. It represents the analysis in the form of graphs and pie chart.

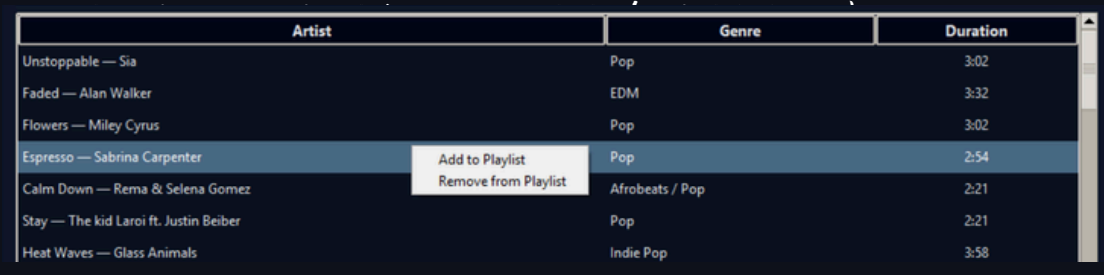
Dark green= show the songs which are added to the playlist

Yellow= to add or remove the selected song from the playlist

To add songs to the playlist

Any one of the methods can be used

- The songs can be selected by double click
- Right click and add to playlist



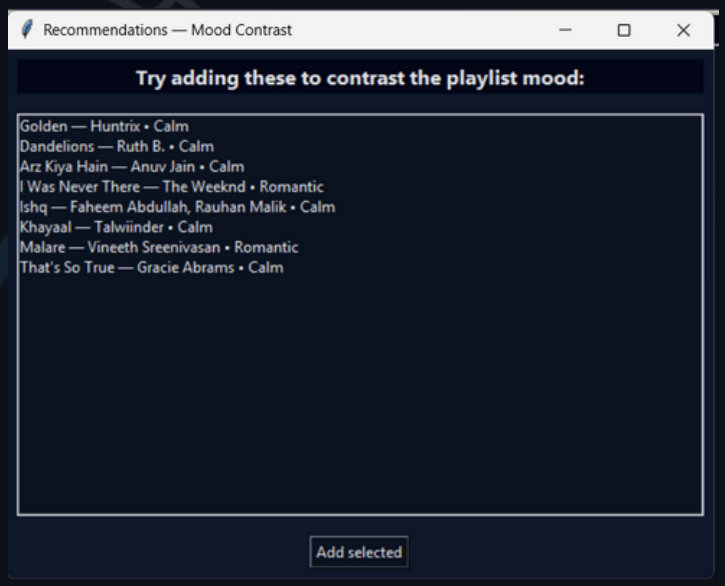
For Example: We have added around 10 songs to our playlist

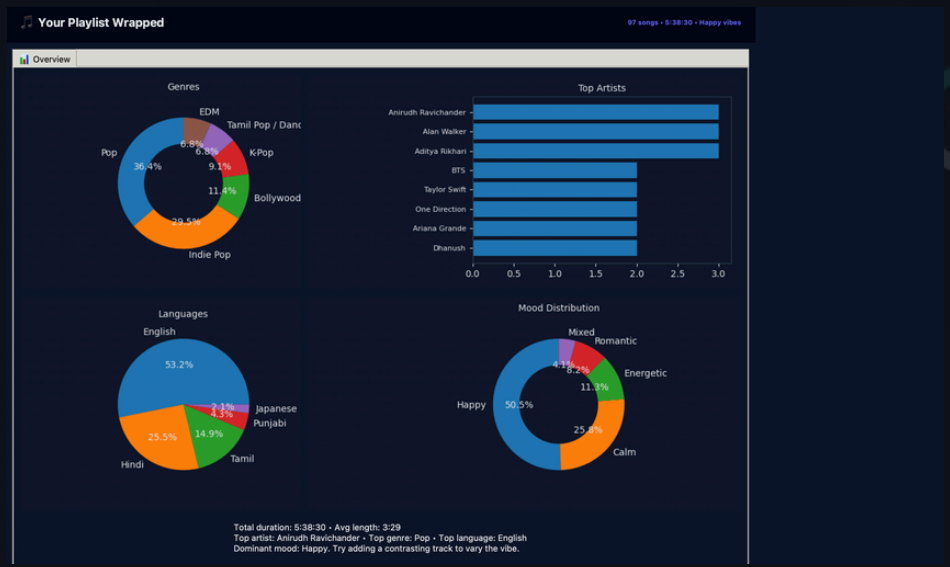
the live stats shows the number of songs added to the playlist,average duration of songs, the total time the playlist would play, top artist , top genre etc..

At the bottom , it shows the song which are there in the playlist

When We click on Recommend

A list of recommended song pop up on the screen , which can be added by the user





When We click on Wrapped

Gives graphical representation of - genres , top 5 artists, Languages, mood distribution.

Challenges Faced

During the development of AUDION, several key challenges were addressed:

1. Interface Layout and Graph Positioning

Achieving a balanced and visually clear Tkinter layout required multiple iterations. Adjusting graph alignment, resizing elements, and integrating the logo demanded careful refinement.

2. Dependency and Compatibility Issues

Modules such as matplotlib and openpyxl occasionally produced installation errors on different systems. Ensuring consistent performance across devices required additional debugging.

3. Performance Optimization

Larger playlists initially caused delays in graph rendering. Workflow improvements were implemented to ensure smooth data processing and faster load times.

Scope for Improvement

To enhance functionality and user experience, the following developments are planned:

1. Built-in Music Playback

Enable users to directly play songs from the interface for a more integrated, interactive experience.

2. BPM and Mood Analysis

Introduce tempo detection and automatic mood classification for deeper playlist insights.

3. AI-Based Recommendations

Implement song and playlist recommendations using user patterns and listening preferences.

4. Exportable Reports

Allow users to generate downloadable PDF or DOCX reports of their playlist analysis.

5. Customizable Themes and Interactive Charts

Add multiple UI themes and more dynamic, responsive charts to improve visualization and user engagement.

Thank You