*REPORT*

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# Comparative Analysis of Music Genres using Spectrograms

*Submitted as part of Speech Understanding Programming Assignment 1*

**by**

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# Chapter - 1

# Analysis of Music Genres using Spectrogram

## 1.1 Spectrogram Visualisation

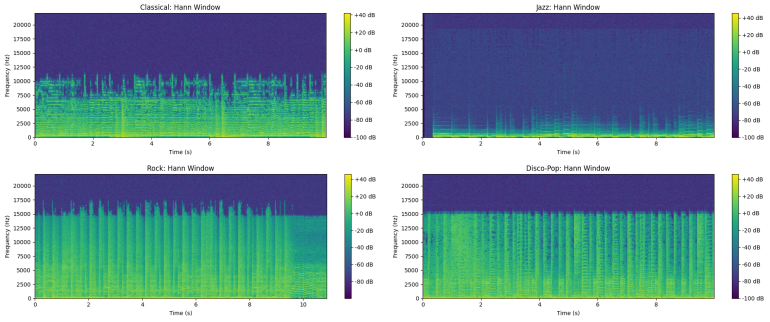


Figure 1.1: Spectrograms

## 1.2 Time-Frequency Resolution

- **Classical:** Often shows steady frequency components.
- **Jazz:** Display low frequency compared to other three.
- **Rock:** Has dense energy bursts at mid and high frequencies (guitars, percussion).
- **Disco-Pop:** Balances energy across frequencies, emphasizing vocals and rhythm.

### 1.3 Dynamic Range

- **Classical:** Have a wider dynamic range (quieter and louder sections).
- **Rock and Pop:** Dynamically compressed with consistent loudness.

### 1.4 Frequency Band Dominance

- **Classical:** Low-frequency dominance for string instruments.
- **Jazz:** Balanced distribution with highlights in mid-frequency (horns, piano).
- **Rock:** Strong high-frequency dominance (electric guitars, cymbals).
- **Pop:** Mid-frequency dominance with rhythmic patterns.

### 1.5 Comparative Analysis

#### 1.5.1 Energy Distribution

- **Classical:** Has distinct, well-separated harmonics.
- **Rock:** Spectrograms are densely packed, showing high energy in short bursts.
- **Jazz:** Exhibits a mix of harmonic patterns and transient peaks.
- **Pop:** Rhythmically consistent with prominent mid-frequency bands.

#### 1.5.2 Time-Frequency Patterns

- **Classical:** Spectrograms show elongated horizontal patterns, reflecting sustained notes.
- **Jazz:** Displays irregular frequency shifts due to improvisation.
- **Rock:** Shows consistent energy spikes corresponding to drum beats and electric guitars.
- **Pop:** Shows clear rhythmic patterns and steady vocal elements.

#### 1.5.3 Harmonic Content

- **Classical:** Rich harmonic content with well-separated partials.
- **Jazz:** Harmonics vary, with a focus on syncopation and improvisation.
- **Rock:** High-energy harmonics, especially in the mid to high-frequency range.
- **Pop:** Harmonically simpler but rhythmically consistent.