

Adaptasi Positional Encoding pada Arsitektur Transformer untuk Sintesis Notasi Gamelan yang Koheren dan Terkendali

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Previous Work

Decoding PDF files

Ayek-Ayaken **Nem**, lászlónő pethet nem.

四

50

6 (6) 5 (6) 3 (2) 1 (6)

Unicode Code (Hex)	Visual Character	ASCII/Unicode Value (Dec)	Glyph ID (GID)
U+0628		32	3
U+0629)	41	26
U+062B	+	43	28
U+063D	-	45	30
U+0640	@	64	49
U+0642	B	66	51
U+0643	C	67	52
U+0645	E	69	54
U+0646	F	70	55
U+0648	H	72	57
U+0649	I	73	58
U+064A	J	74	59
U+064C	L	76	61
U+064D	M	77	62
U+064F	O	79	64
U+0650	P	80	65
U+0651	Q	81	66
U+065B	R	91	76
U+065D	S	93	78
U+065E	T	94	79

Notasi gamelan Ayak-ayakan Nem Slendro

pt. Nem

Cmap font balungan.

```
##Page 0##
Ayak-Ayakan Nem, laras sléndro pathet nem
Buka
M@ -+ L) -+ M)^ -+ L) -+ M)^
-+ P) -+ O)^ -+ Q) -+ P)^ M+- L) J+ L@]
[ + J + I) + J + L)^ + I + J) + L + M)^ + L + J) + L + M)^ + J + L) + J + I @
L M) L J)^ L M) L J)^ I H) I F)^ I H) I J@]
L M) L J)^ I H) J I)^ F E) C E@]
C B) C E)^ C B) C E)^ I J) L J)^ L I) J L@ ]
Suwuk
F F) E F)^ J I) H F@]
```

Figure: Notasi ayakan decoded

Previous Work

Plotting Structure

Seri pada **Tutur**, lantunan slendro patet sangga

Buka kembang



Figure: Notasi Gamelan

Javanese Gamelan Structure

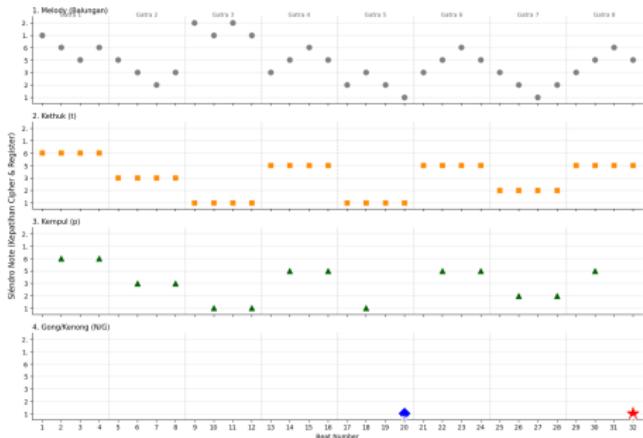
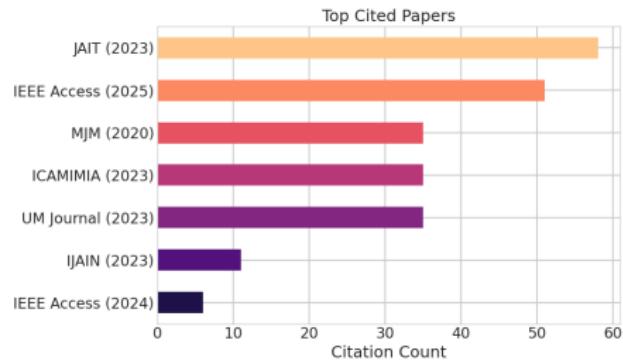


Figure: Plot Struktur

Dataset Insight

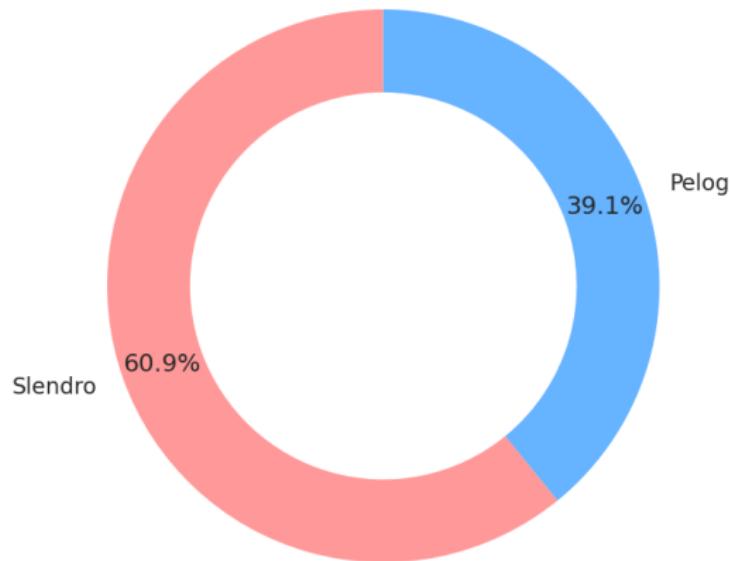


Dataset Overview

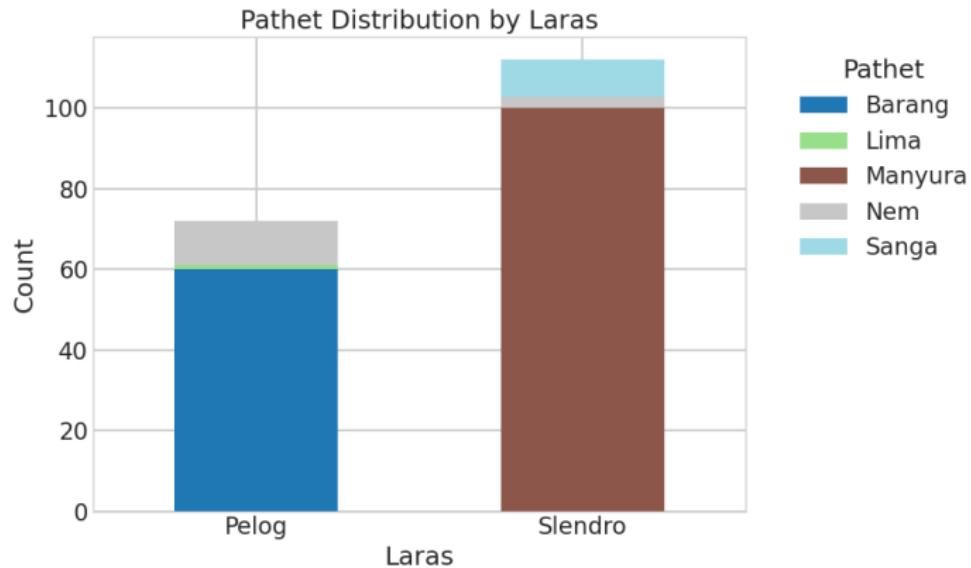
- Total Songs : 189
- Laras : 2
- Cited in Research : 100%

Dataset Insight

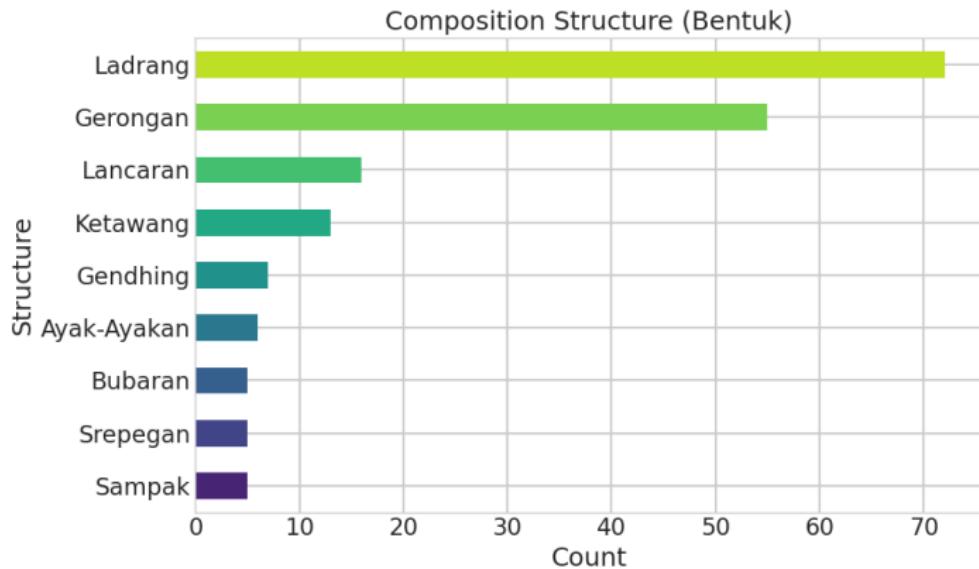
Tuning System (Laras)



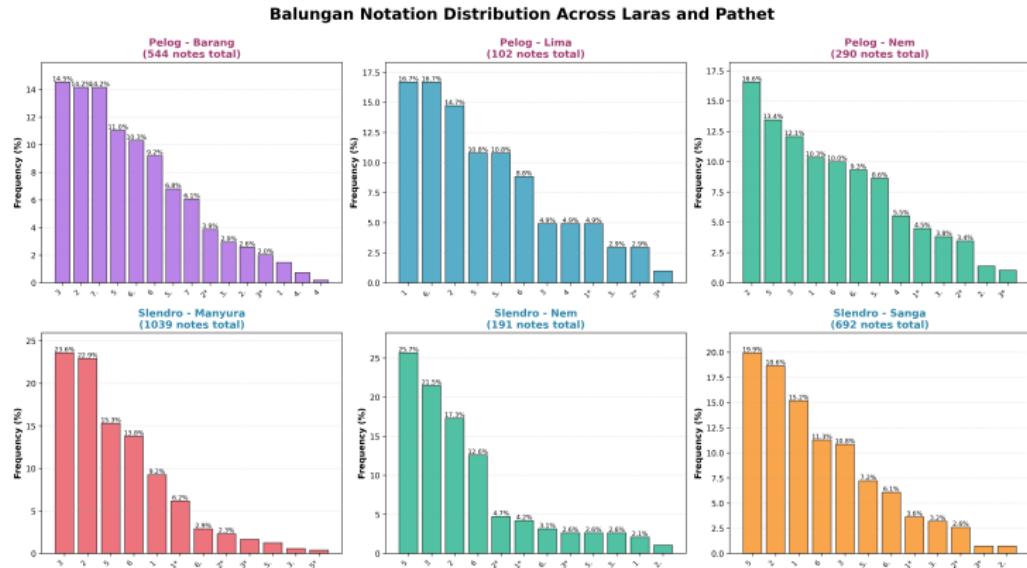
Dataset Insight



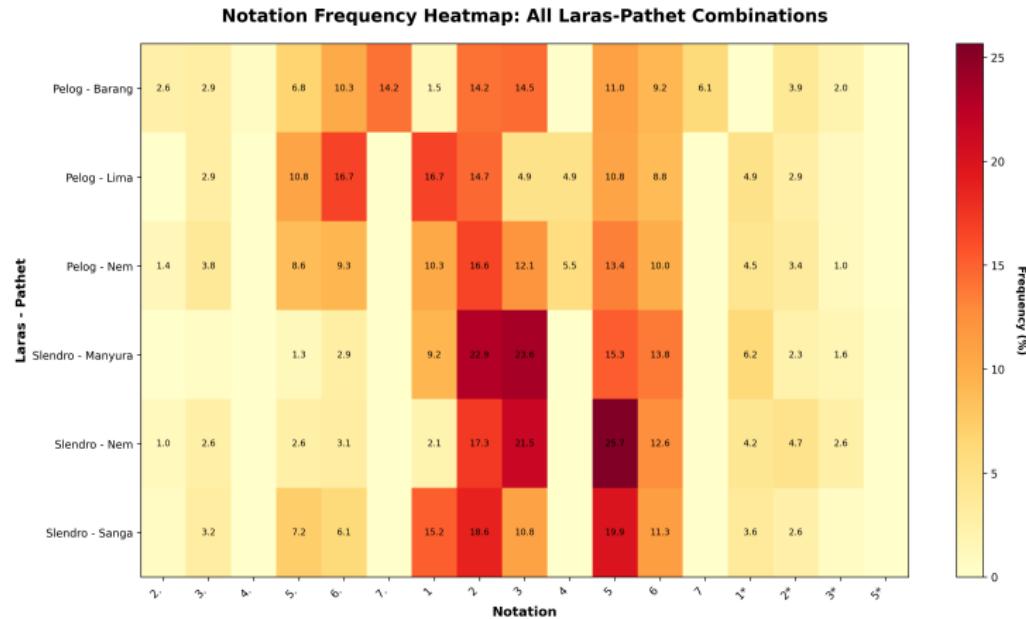
Dataset Insight



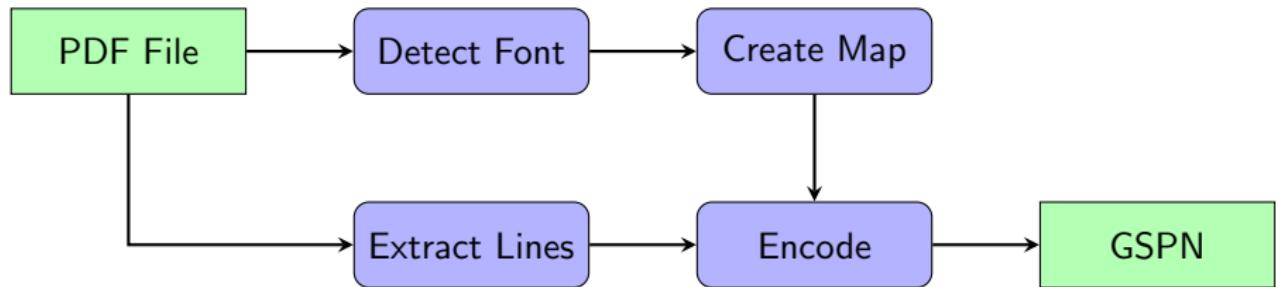
Dataset Insight



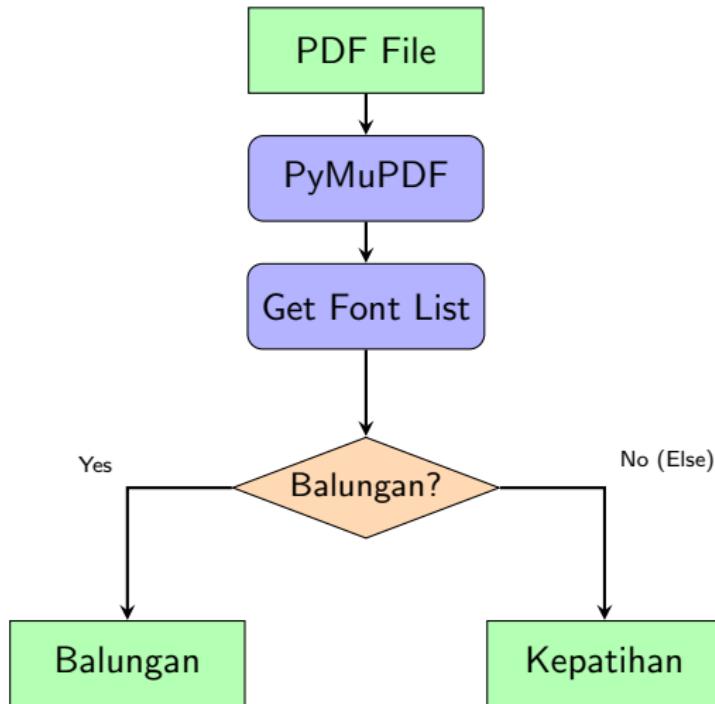
Dataset Insight



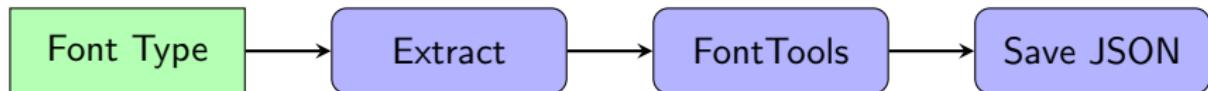
System Overview



Step 1: Font Detection



Step 2: Glyph Map Creation



Example Output (JSON):

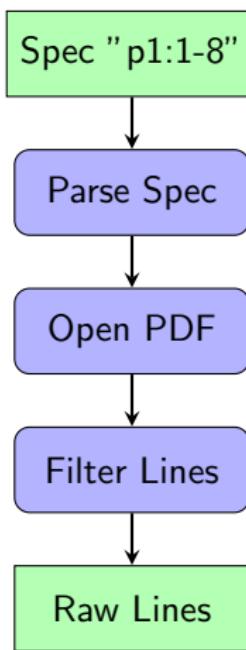
Balungan

"H": "1", "I": "2"

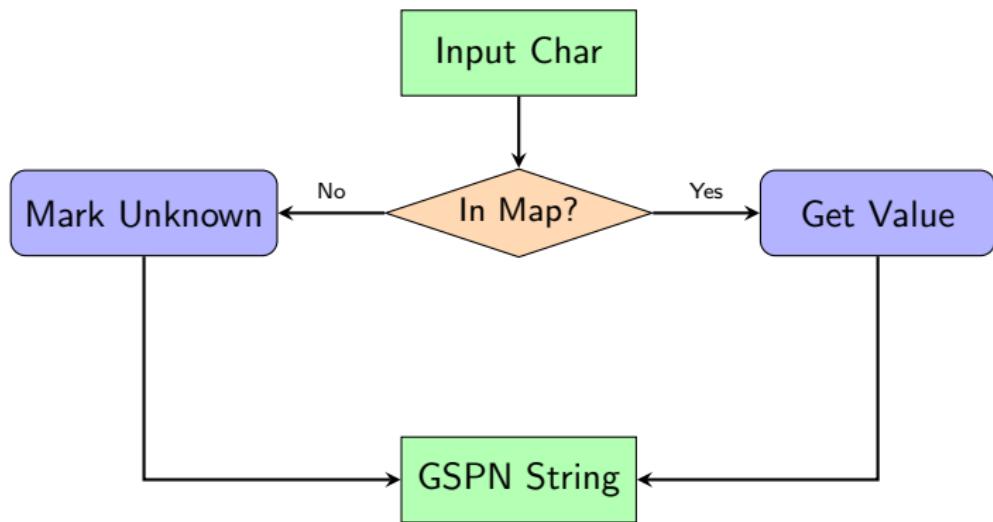
Kepatihan

"1": "1", "e": "3a"

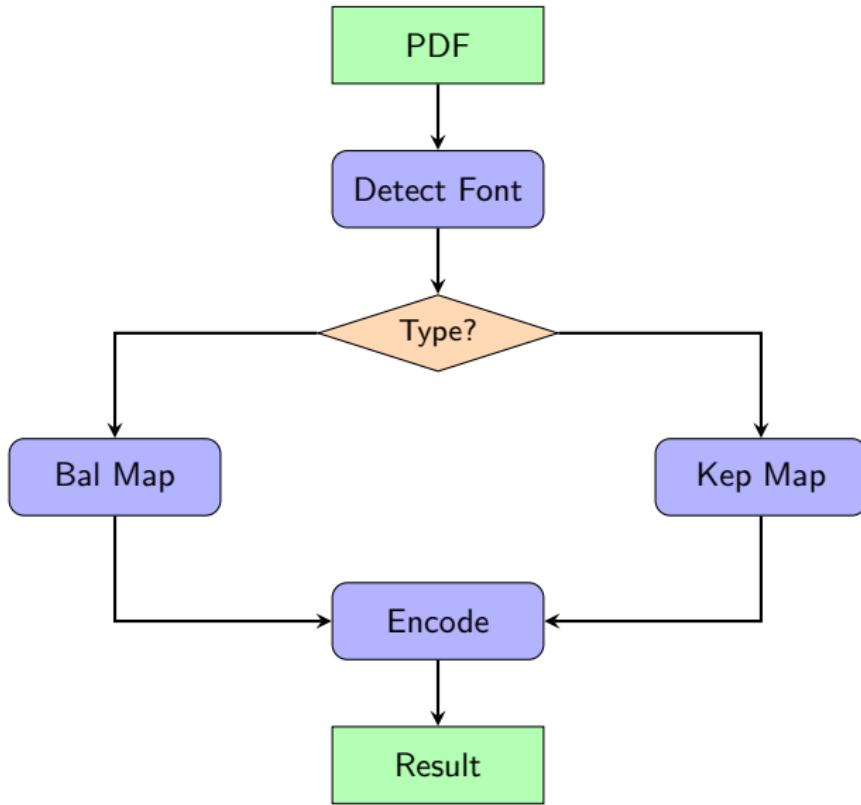
Step 3: Line Extraction



Step 4: Encoding Logic



Complete Processing Flow



Abiyasa: Gamelan Digitalization

Capabilities

- **Extraction:** PDF to data.
- **Systems:** Balungan & Kepatihan.
- **Encoders:** GSPN/QAP.

Install

```
pip install abiyasa
```

Dataset Format

Curated JSON including titles, PDF sources, and line-specific markers (p1:1-5).

Quick Start API

```
import abiyasa

# Load and encode 5 items
data = abiyasa.load_data(
    encoder='GSPN',
    notation_system='kepatihan',
    limit=5
)

for item in data:
    print(item['encoded_data'][0]['encoded'])
```

The GSPN Encoding Strategy

The **Gendhing Scientific Pitch Notation (GSPN)** is the core computational format.

Formula: $T + W + V + G$

- **T (Note)**: 0–7 (0 = rest).
- **W (Octave)**: empty (mid), a (low), b (high).
- **V (Value)**: empty (1), A (1/2), B (1/4).
- **G (Legato)**: x (start), y (end).

System	Notation Example	GSPN Result
Balungan	F F	6a 6a
Balungan	_ _ _F_ _	0A 6aA
Kepatihan	e t y u	3a 5a 6a 7a
Kepatihan	1 2 3	1 2 3

Based on research by Syarif et al. (2020)

Insight

Chapter 4. Music Structure Analysis



Figure: 4.1. From the book

The General Goal of Music Structural Analysis

- Temporal Segmentation
- Structural Identification
- Categorical Grouping

The methods

- Repition-based
- Novelty-based
- Homogeneity-based

Insight

Chapter 4. Music Structure Analysis

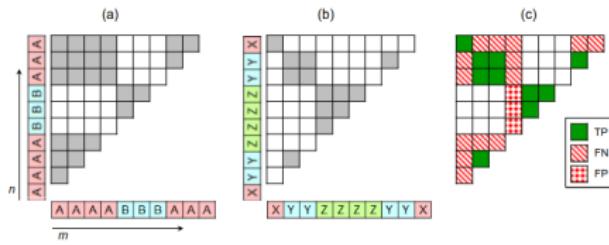


Figure: 4.30. From the book

Evaluation

- Precision, Recall, F-Measure
- Structure Annotations
- Labeling Eval.
- Boundary Eval.
- Thumbnail Eval.

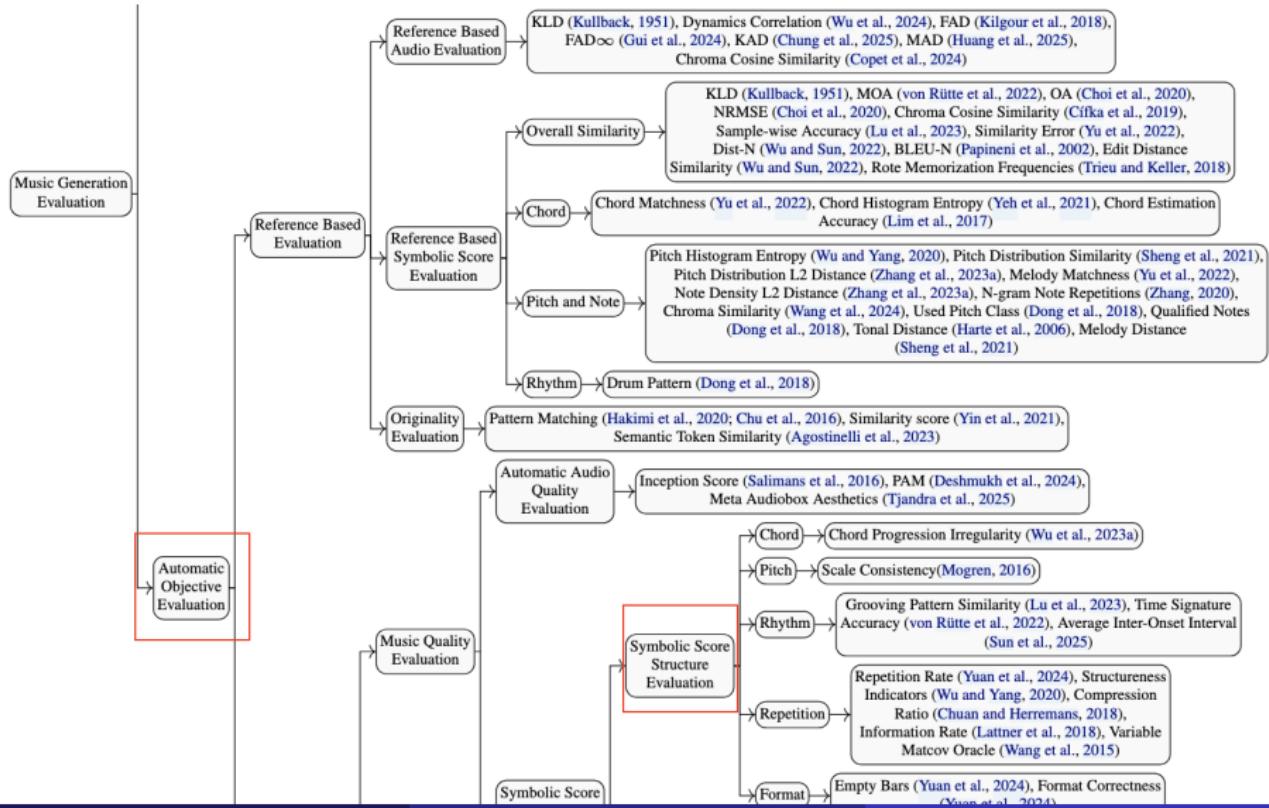
Subjective evaluation are

- Unscalable
- Inability to Guide Improvement
- Missing the "Why"

de Berardinis, J., Cangelosi, A. and Coutinho, E. (2022) "Measuring the Structural Complexity of Music: From Structural Segmentations to the Automatic Evaluation of Models for Music Generation," IEEE/ACM Transactions on Audio, Speech, and Language Processing, 30, pp. 1963–1976. Available at: <https://doi.org/10.1109/TASLP.2022.3178203>.

Insight

Kader FB, Karmaker S. A Survey on Evaluation Metrics for Music Generation [Internet]. arXiv; 2025 [cited 2025 Nov 19]. Available from: <http://arxiv.org/abs/2509.00051>



- Experimental evaluasi struktur pada dataset
- Experimental evaluasi struktur pada previous paper