

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

Arif Akbarul Huda

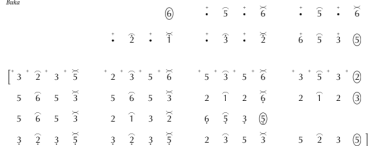
February 11, 2026

# Previous Work

## Decoding PDF files

Ayak-Ayakan **Nem**, laras sléndro pathet nem

Buka



Suwuk



Unicode Code (Hex)	Visual Character	ASCII/Unicode Value (Dec)	Glyph ID (GID)
U+0020		32	3
U+0029	)	41	26
U+002B	+	43	28
U+002D	-	45	30
U+0040	@	64	49
U+0042	B	66	51
U+0043	C	67	52
U+0045	E	69	54
U+0046	F	70	55
U+0048	H	72	57
U+0049	I	73	58
U+004A	J	74	59
U+004C	L	76	61
U+004D	M	77	62
U+004F	O	79	64
U+0050	P	80	65
U+0051	Q	81	66
U+005B	[	91	76
U+005D	]	93	78
U+005E	^	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

Sepeng: **Tlatur**, laras slendro pathet sanga

Buka kumuhang

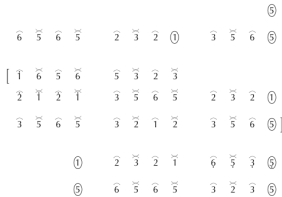


Figure: Notasi Gamelan

Javanese Gamelan Structure

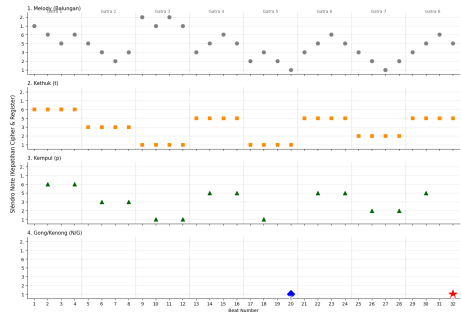
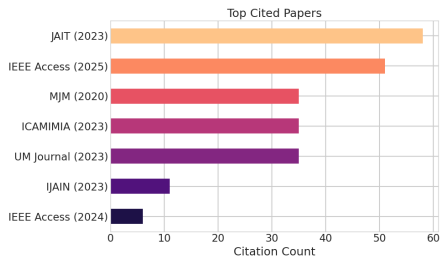
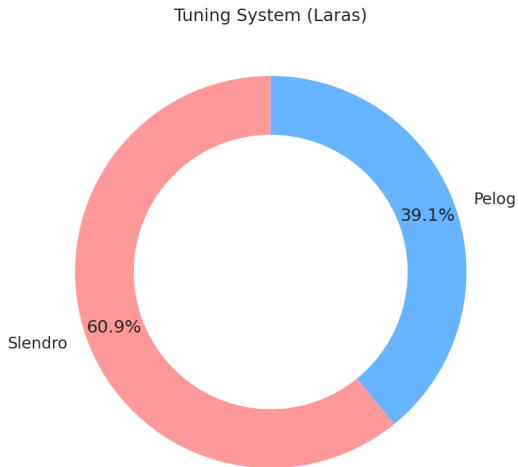


Figure: Plot Struktur

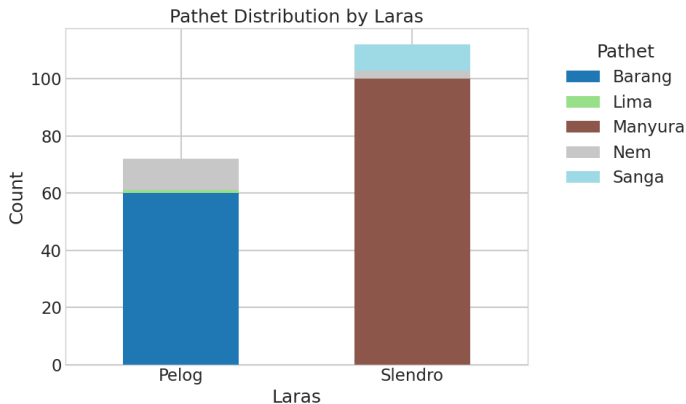


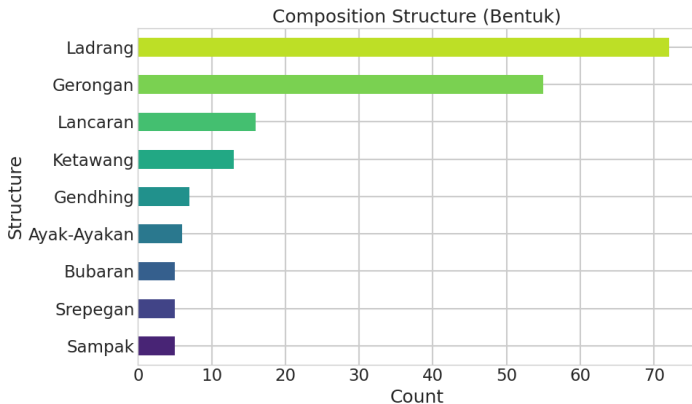
## Dataset Overview

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

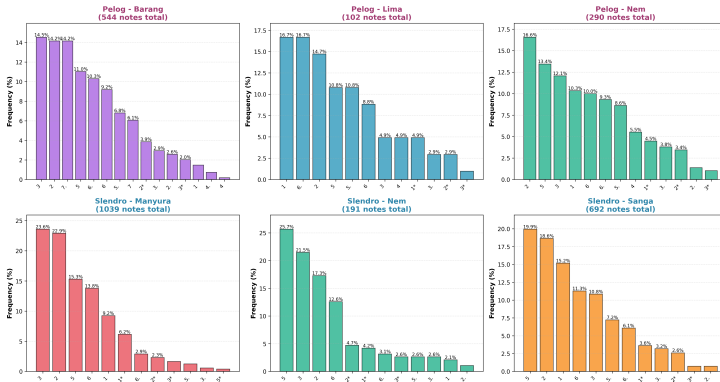


# Dataset Insight



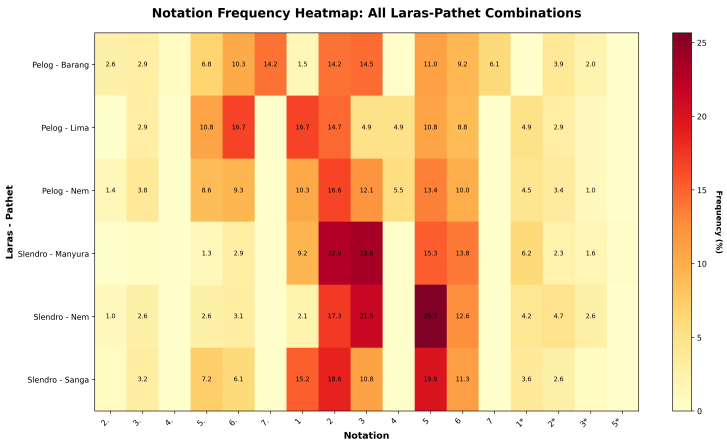


## Balungan Notation Distribution Across Laras and Pathet

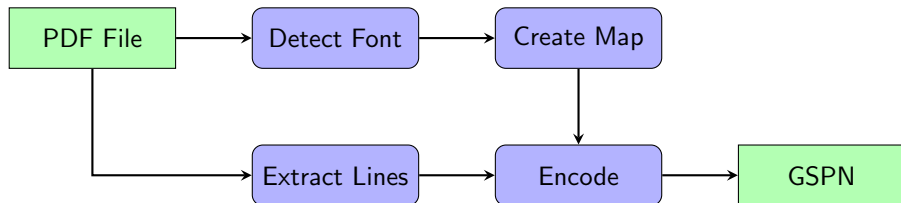




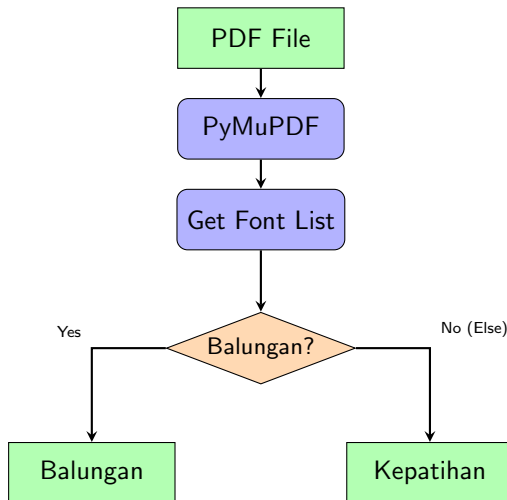
# Dataset Insight



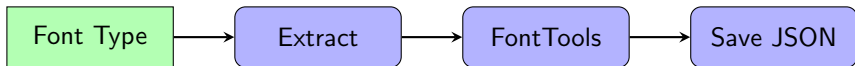
# System Overview



# Step 1: Font Detection



## Step 2: Glyph Map Creation



### Example Output (JSON):

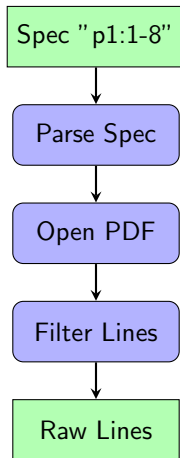
**Balungan**

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

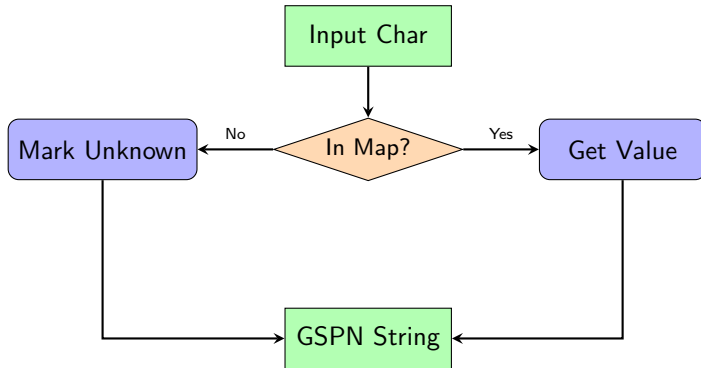
**Kepatihan**

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

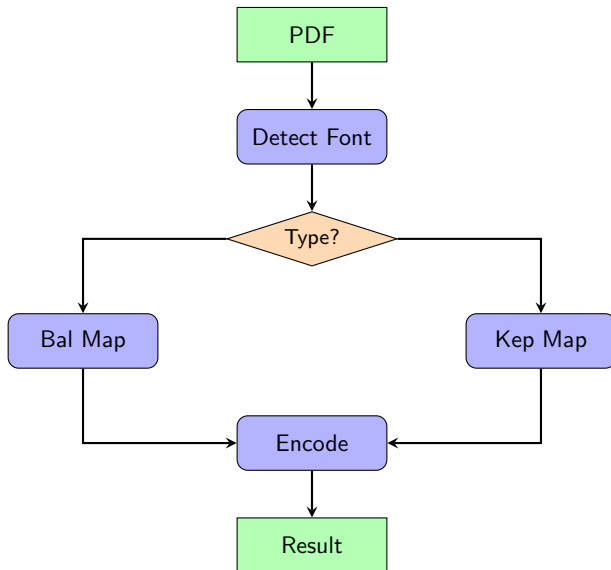
## Step 3: Line Extraction



## 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
```

## 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'])
```

## Dataset Format

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



# The GSPN Encoding Strategy

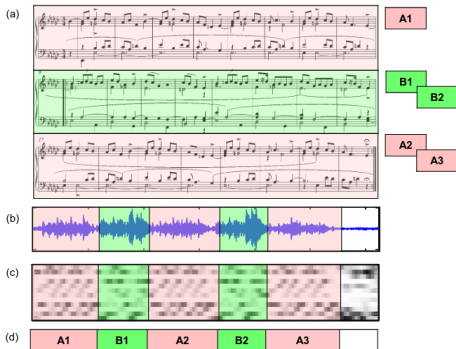
The **Gendhing Scientific Pitch Notation (GSPN)** is the core computational format.

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)*



### The General Goal of Music Structural Analysis

- Temporal Segmentation
- Structural Identification
- Categorical Grouping

### The methods

- Repetition-based
- Novelty-based
- Homogeneity-based

Figure: 4.1. From the book

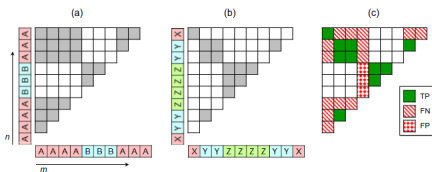


Figure: 4.30. From the book

### Evaluation

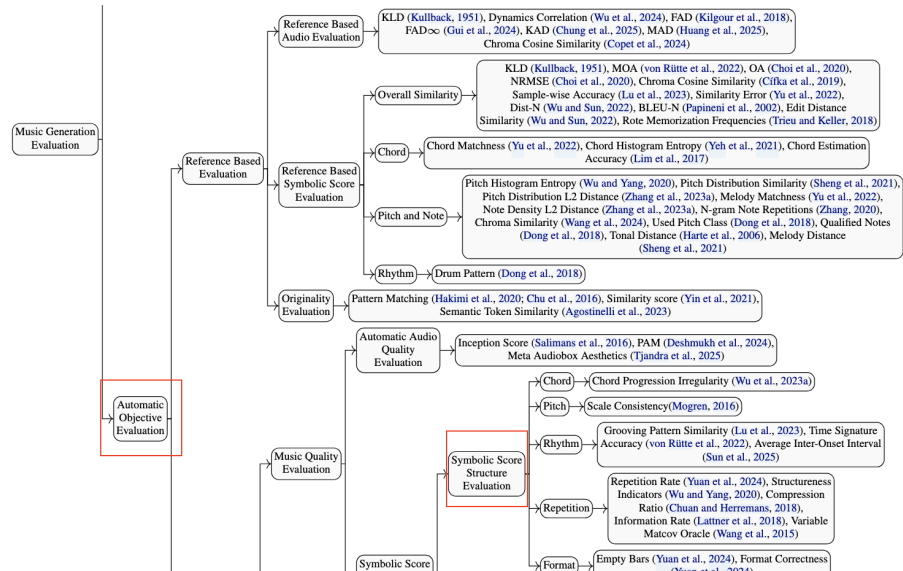
- Precision, Recall, F-Measure
- Structure Annotations
- Labeling Eval.
- Boundary Eval.
- Thumbnail Eval.

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>.

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