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EVALUATING MUSICAL SCORE DIFFERENCE
A TWO-LEVEL COMPARISON

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Goal: Have a diff tool for music scores, similar to the Unix diff utility

Why:
• Collaborative score editing
• Music transcription evaluation
• OMR evaluation

Issues:
• the line structure of a XML file does not reflect the its musical structure → not meaningful to apply a text diff to XML scores.
• What exactly we evaluate? Graphical content or musical content?

Our Approach

Two comparison on two different objectives:
1. Syntactic level: the graphical content of the score (beamings, tuplets, dots, ties, etc.).
2. Semantic level: the musical content of the score (notes duration and pitch).

For both cases the output is:
• a list of the modifications to transform one score into the other,
• a value Δ, that evaluate the difference between the two scores.

1 Syntactic difference
We model the graphical score with notation trees [5]:
• Beaming Tree
• Tuplet Tree

• Find Least Common Substring (LCS) between trees hash for each voice.
• Equivalent to compute an edit distance with only insertion and deletion operations.

Implementation
Partial implementation in the digital music library NEUMA (neuma.hum-num.fr/).
Two REST API:
• Input: 2 midi files
• Input: 2 music-xml or MEI scores

A graphical representation with Verovio web library.

2 Semantic difference
We model the score content with timelines (similar to MIDI files).

From each timeline we:
1. build a sequence of couples <pitch, duration>.
2. Compute an edit distance with the usual operations (insert, delete and update) [4]

This difference is feature-based:
• pitch only,
• durations only,
• both features.

\[ \Delta_{SEM} = a \cdot \text{#UPD} + \beta \cdot \text{#INS} + \gamma \cdot \text{#DEL} \]
\[ \text{#events} \]

where \( a, \beta, \gamma \) are user-defined cost/weight values.

REFERENCES

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