



# An Objective Assessment of Musical Complexity: Translating Music Pedagogy’s Deep Insights with Novel Computing Paradigms

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## Inspiration

“Which piano concerto is more difficult: Rachmaninoff’s Second or Third?”

Performers, band directors, educators, and publishers would like to find out.

State of the practice---analyze music scores by hand.

“Would you rather spend your precious time on more creative pursuits?!”

## Problem Statement

- Music educators and musicians need to accurately assess the complexity of music pieces to determine what they can best perform.
- Current methods of scoring are subjective and are often inaccurate.
- Users need a simple tool to quickly expose the underlying complexity of a piece automatically.

## Solution Approach Overview

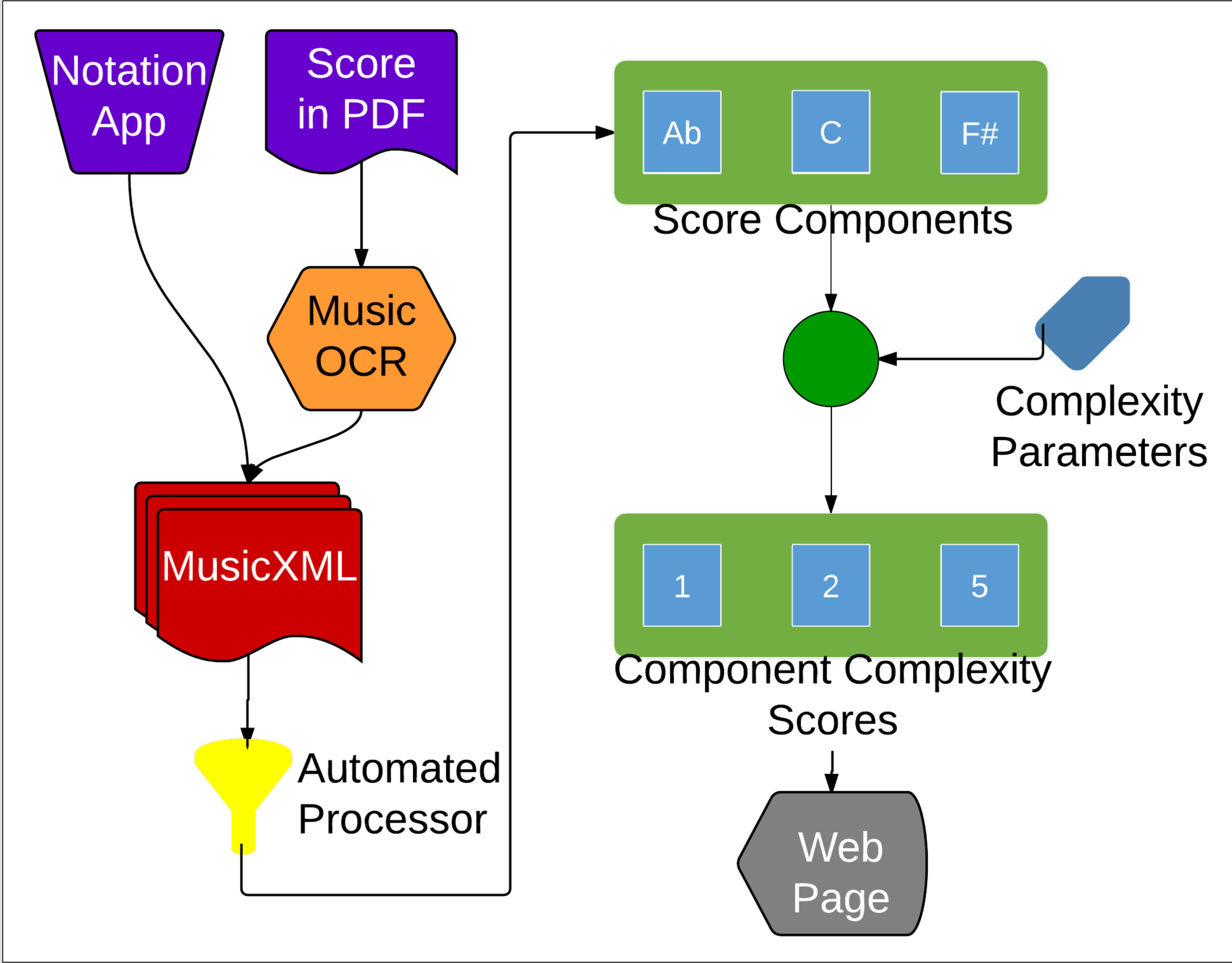
- Step 1:  
Gathering Information

- Survey instrument experts to determine a consensus for the difficulty of certain musical elements.
- Step 2:  
Mapping Complexity

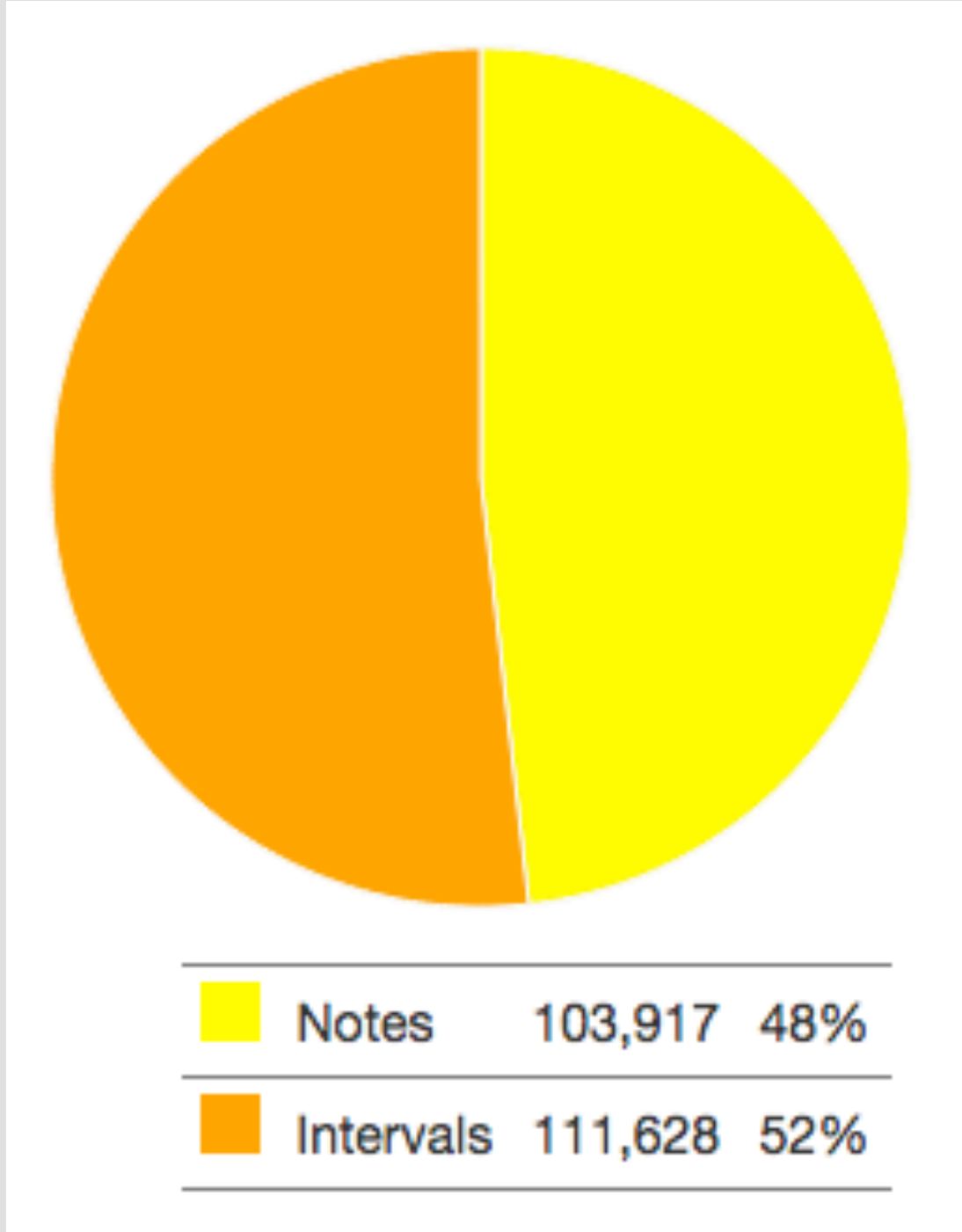
- Statically analyze the musical elements of a piece and map them to the specified difficulties in Java.
- Step 3:  
Passing Data

- Determine the final score and meta data and pass it to the web interface as JSON.
- Step 4:  
Revealing Insights

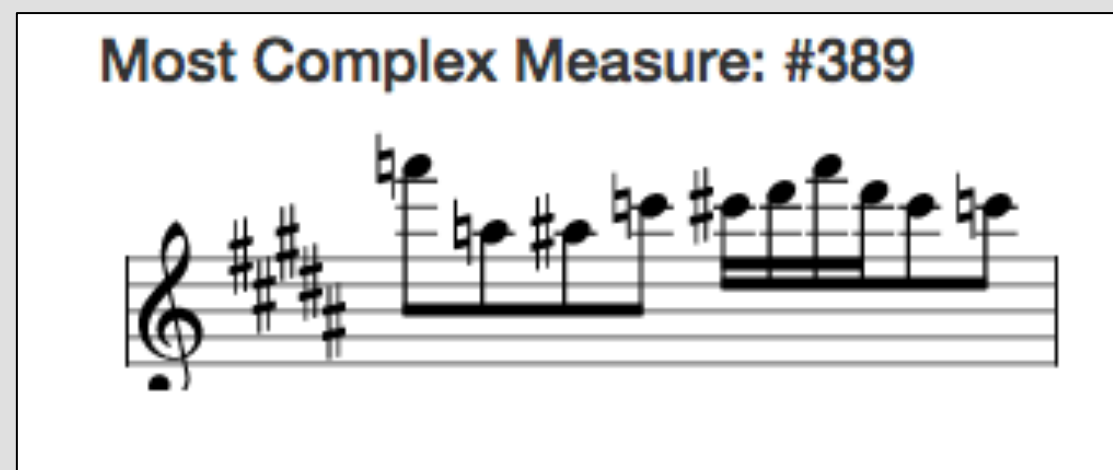
- Leverage Javascript libraries to display the final score and meta data in an easily readable form.



Exploring Complexity at  
Different Levels of Granularity



Overall Complexity:  
Notes vs. Intervals Breakdown



## Practical Impact

- Enable objective and accurate complexity evaluation for music educators and performers.
- Automate tedious, subjective process.
- Free user resources for creative tasks.
- Apply music pedagogy insights to create novel computing paradigms.

## Technical Details

- HTML5 web-based application hosted in the cloud.
- Evaluation algorithm implementing a high fidelity, bottom-up scoring heuristic.
- Computing engine scalable with score length and instruments involved.

## Applicability

- Can analyze MusicXML for single or multi-part scores.
- Limited instrument difficulty settings.
- Need expert feedback to determine further difficulty settings.

## Future Work

- Support hand-written scores with music OCR.
- Include a broader set of instruments.
- Collaborate with music libraries, such as *imslp.org*.

