



SUBHEAD OR NAME OF SCHOOL, DEPARTMENT, OR UNIT

Music Transposition Project

INDIANA UNIVERSITY SOUTH BEND

1.

What is Music Transposition?

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1. When musicians play together, they need to have the same pitch reference to sound good together.
2. For historical and practical reasons, absolute pitch is notated in different ways in music for different instruments.
3. ***Transposition*** is the process where music originally written for one instrument is changed so another can read it in accurate pitch.



What is Music Transposition?

Oboe:



Alto Saxophone:



Usage

- Chamber music:
 - Create tool for music performers to quickly and accurately transpose pieces so new combinations can be prototyped.
 - Must try and see if new combination sounds good, that process takes a lot of time.
- Personnel Emergencies/replacements
-



Usage

- Need:
 - fast transposition of **photocopied images** or **smartphone photos of sheet music**



2.

Existing Methods

Existing Methods

- If digital encoding exists:
 - Operation trivial
- If no encoding exists:
 - Optical Music Recognition
 - Most current applications are end-to-end, but high rate of errors
 - End-to-end not required for transposition



Existing Methods

- Need two main steps of OMR:
 - Staff line identification and removal
 - Accidental identification and replacement



Staff Lines + Accidentals

Oboe:



Alto Saxophone:



Staff Line Removal Strategies

- Rune-based removal (Su et. al)
- Line-based tracking
- Neural networks

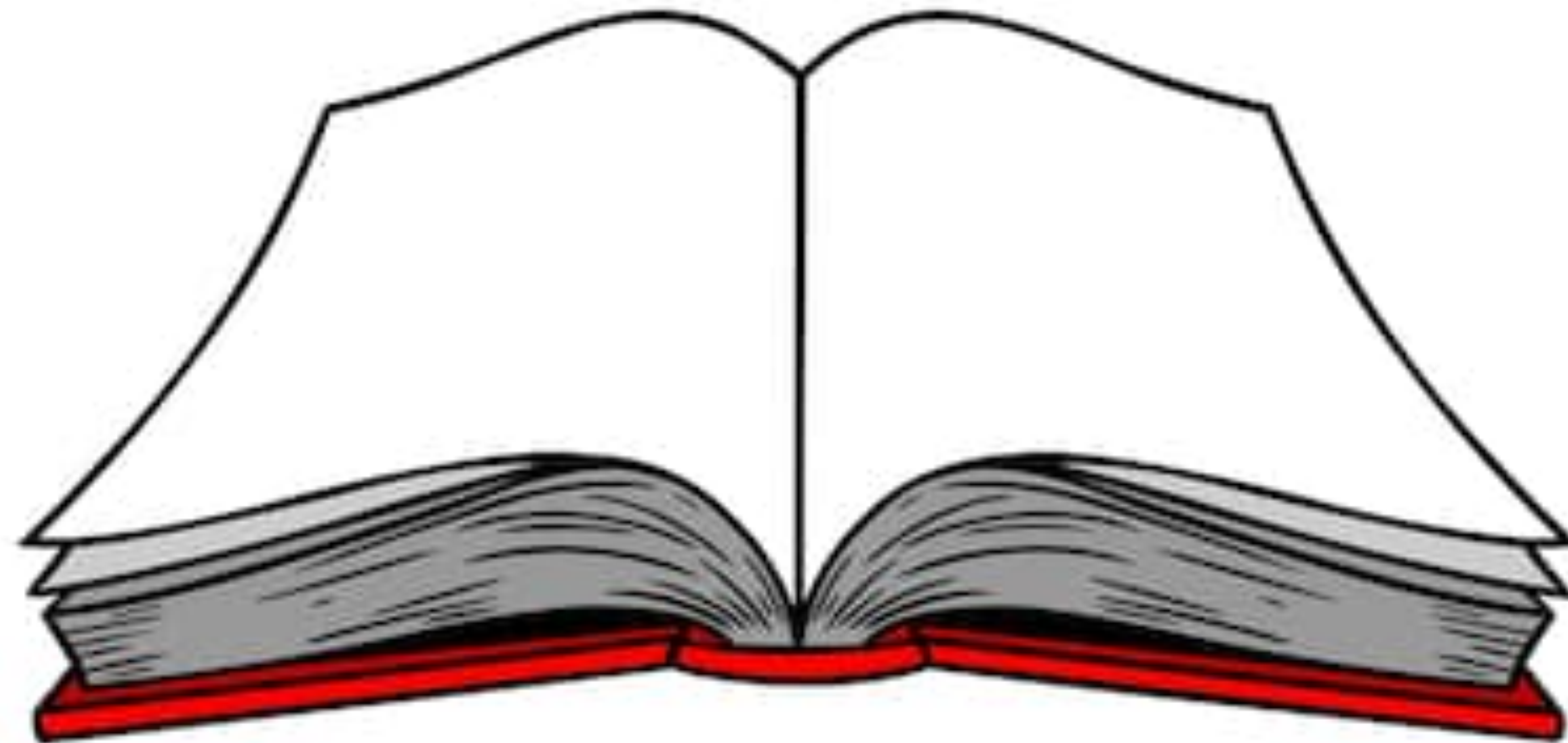


Staff Line Removal Strategies

- Rune-based removal (Su et. al):
 - Most effective if assume that staff lines are equal thickness and equally spaced



Photographed sheet music



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Handwritten musical score for measures 35, 37, and 40. The score is written for a full orchestra, including T (Trumpet), Fl (Flute), Ob (Oboe), Cl (Clarinet), Hrn (Horn), and Bn (Bassoon). The notation includes various musical symbols such as notes, rests, and dynamic markings like *mp* and *f*.

Handwritten musical score for measures 42, 44, 46, 48, 50, and 52. The score is written for a full orchestra, including T (Trumpet), Fl (Flute), Ob (Oboe), Cl (Clarinet), Hrn (Horn), and Bn (Bassoon). The notation includes various musical symbols such as notes, rests, and dynamic markings like *f*, *mp*, *p*, *pp*, *cresc.*, and *decreas.*. The score also includes tempo markings such as *poco piu mosso*, *poco rit.*, *trun*, *tempo*, *rubato*, and *sf*. Measure numbers 4, 3, and 2 are indicated at the bottom of the staves.

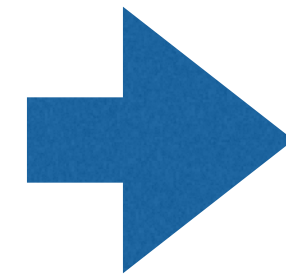


. 3.

Possible Strategy

Degradation + Point-based Registration

Handwritten musical score for a piece in 4/4 time, marked "poco più mosso". The score consists of ten staves of music. The first staff is marked "4" and "poco più mosso". The second staff has a "f" dynamic. The third staff has "mf cresc." and "f". The fourth staff has "poco rit." and "trum". The fifth staff has "trum" and "mf". The sixth staff has "tempo" and "p". The seventh staff has "tempo 3" and "p". The eighth staff has "poco rit." and "tempo". The ninth staff has "poco rit." and "mf". The tenth staff has "tempo" and "sf". The score includes various musical notations such as notes, rests, and dynamic markings.



A series of ten empty musical staves, corresponding to the ten staves of the handwritten score.

