The Sight-Reading Tutor

Diane Hu, Jie Cheng, Lawrence Saul
The Sight-Reading Tutor

An Automatic Sight-Reading Tutor
For Solo Instrumental Music
What is sight-reading?

Sight-reading is:

- the ability to play unfamiliar music from a score
- a learned skill, independent of technique and theory
- rarely addressed in music education...
What is sight-reading?

... but is an integral part of musicianship!

If you can sight-read, you can:

- easily tackle new music pieces
- participate in ensembles
- accompany other musicians
- perform on the fly!
The Sight-Reading Tutor

Learning to sight-read is hard!

What would the ideal “sight-reading tutor” look like?

- Provide immediate feedback
- Work at your own pace and level
- Monitor and quantify progress
- Fun!
The Sight-Reading Tutor

Using The Sight-Reading Tutor

1. Put machine near tuned instrument
2. Select a song based on difficulty, adjust tempo
3. Play notes as the score scrolls across the screen
4. Earn points for every note that is played correctly
The Sight-Reading Tutor

Settings
- Medium
- Surprise Symphony
- Metronome On/Off

Details
- Title: The Surprise Symphony
- Composer: Haydn
- Difficulty: Medium
- Time Signature: 4/4
- Key Signature: C
- Default Tempo: 84
- Comments:

Scoreboard
- Correct Notes:
- Missed Notes:
- Current Score:
- Total Score:
Formulate pitch recognition as a learning problem

Train system to recognize mono/polyphonic music:

- Compute templates from audio clips of isolated notes
- Use templates for real-time pattern matching
Non-negative Matrix Factorization (NMF):

An unsupervised learning algorithm for discovering constituent parts of complex objects
Behind The Scenes

Original application:
modeling faces as a superposition of eyes, noses, mouths, and other features

Our application:
modeling chords as a superposition of individual notes
Reaching The Masses

Related (working) systems:

- Automatic music transcription
- Auto-accompaniment
- Music classification

These are harder problems, but relevant only to a subset of musicians with specific needs
Reaching The Masses

The Sight-Reading Tutor is needed by, and useful to a much larger population, from:

- beginners to advanced
- pianists to flutists
- classical musicians to jazz musicians
Impact & Contributions

In music education:

- Fulfills the criteria of an “ideal sight-reading tutor”
- Getting good at the game = getting good at sight-reading

In computer audition:

- Showcase a system with real-time capabilities
- Apply NMF in a novel way