Piano Fingering Generation Based on a Player's Style

CS 7643 Deep Learning
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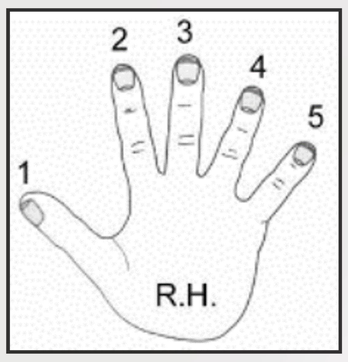
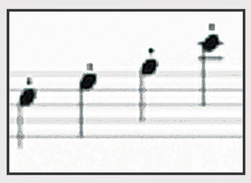
Project ID: 23

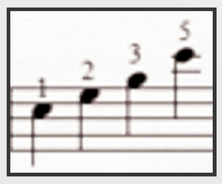
Task Definition



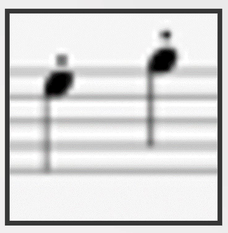
Fingering



No Fingering

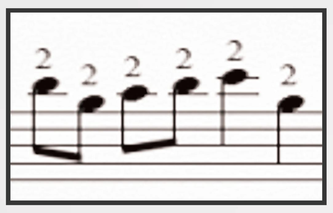


With Fingering

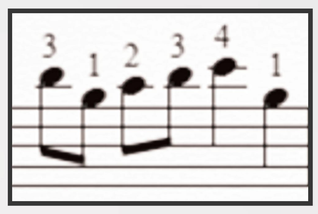


Interval
"Pitch distance"

Motivation



Bad Fingering

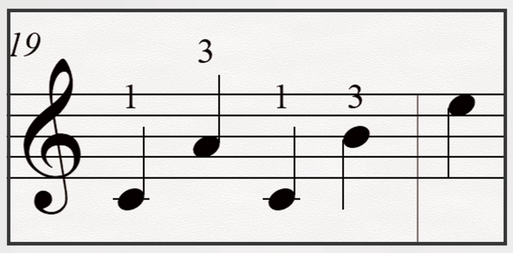


Good Fingering

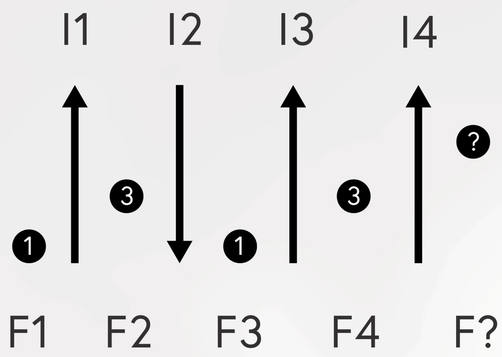
- Develop habits for piano students
- Save time for advanced piano players
- Create different musical effect for experts

Data & LSTM Model

Preprocessing:



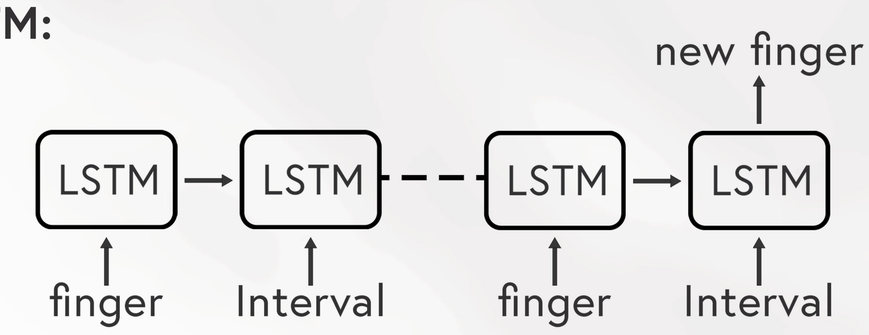
Fingering: 1 3 1 3 ?



Dataset:

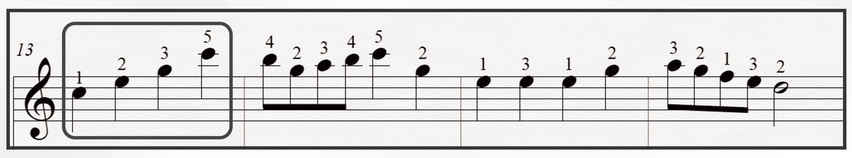
- A classic piano pedagogy book Czerny 599, 100 songs in total, 70 of them are used as training data.
- Labels are made by ourselves
Verified by Dr. Timothy Hsu (Center of Music Technology)

LSTM:

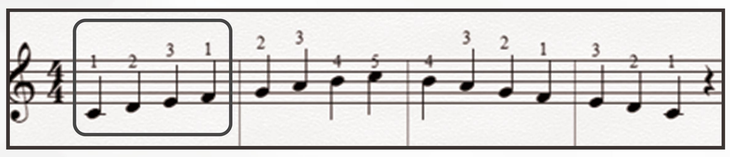


Innovation:
- Using Deep Learning to solve piano fingering problem, this is a new approach on this task.
- The input of LSTM cells are in different domains (Fingering and Intervals).

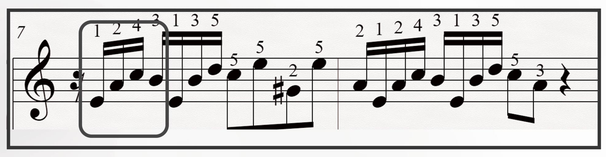
Results



Another phrase from Czerny 599



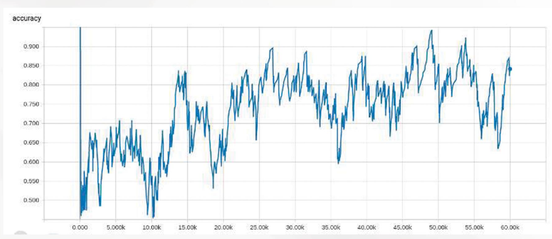
C-major scale
It learned to play the scale by using the standard fingering



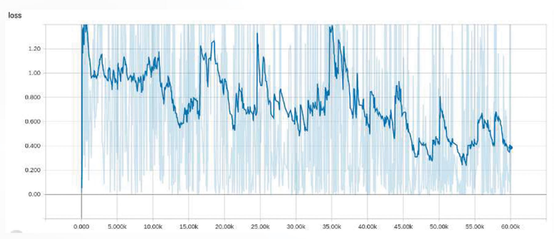
A phrase by Bach
Generated fingering violated some basic piano rules

Methods for Evaluation:
- No Groundtruth for testing.
- Make sure the generated fingering are not breaking basic piano rules.
- The training dataset was constructed by a team member. Therefore, the team could actually try generated fingerings on a piano.

Results from Training



Accuracy



Loss

Limitations:
Heavily depend on variety of the training data.
Heavily depend on the player's habit

Music Phrases vs Whole Score:
- The system will prefer to a musical phrases as an input rather than the whole musical score.
- Shorter input sequence will give the users a higher predicting accuracy.
- This is more reasonble according to musicology.