

University of Rochester Multi-track Music Performance (URMP) Dataset

Last Update: Feb 2019

1. HOW TO CITE URMP DATASET?

Any use of the URMP dataset should be acknowledged by citing the following references:

B. Li, X. Liu, K. Dinesh, Z. Duan, G. Sharma, “Creating a multi-track classical music performance dataset for multi-modal music analysis: challenges, insights, and applications”, *IEEE Transactions on Multimedia*, vol. 21, no. 2, pp. 522-535, 2019.

B. Li, X. Liu, K. Dinesh, Z. Duan, G. Sharma, “Data from: Creating a multi-track classical music performance dataset for multi-modal music analysis: challenges, insights, and applications”, *Dryad Digital Repository*. <https://doi.org/10.5061/dryad.ng3r749>.

2. MAIN FEATURES OF URMP DATASET

We introduce a dataset for facilitating audio-visual analysis of musical performances. The dataset comprises a number of simple multi-instrument musical pieces assembled from coordinated but separately recorded performances of individual tracks. For each piece, we provide the musical score in MIDI format, the high-quality individual instrument audio recordings and the videos of the assembled pieces. We anticipate that the dataset will be useful for multi-modal information retrieval techniques such as music source separation, transcription, performance analysis, and also serve as ground-truth for evaluating performances.

3. DETAILED CONTENT

There are totally 44 pieces included in the dataset, corresponding to the 44 subfolders, where the high-quality audio and video for each player track, original score in MIDI and PDF, and annotated ground-truth for audio tracks are stored.

3.1. Folder Structure

Naming convention:

| $N_piece_instrument$ | Folder name |
|--|---|
| • $AuMix_N_piece_instrument.wav$ | High quality audio recording mixed from single recordings |
| • $AuSep_n_instrument_N_piece.wav$ | High quality audio recording of track n |
| • $F0s_n_instrument_N_piece.txt$ | Ground-truth annotations on each frame for audio track n |
| • $Notes_n_instrument_N_piece.txt$ | Ground-truth annotations on each played note in audio track n |
| • $Sco_N_piece_instrument.mid$ | MIDI score |
| • $Sco_N_piece_instrument.pdf$ | Sheet score |
| • $Vid_N_piece_instrument.mp4$ | High quality video recording assembled from single recordings |

N : The numeric index of the piece.

$piece$: The distinct abbreviation for each piece name (see Table. 1).

$instrument$: The abbreviation of instrument names performed in the file (see Table. 2). Multiple instruments are split with underline and ordered by track number.

n : The numeric index of the individual track.

Taking the first piece as an example:

- 01_Jupiter_vn_vc: Folder name
 - AuMix_01_Jupiter_vn_vc.wav: High quality audio recording assembled from single recordings
 - AuSep_1_vn_01_Jupiter.wav: High quality audio recording of track 1
 - AuSep_2_vc_01_Jupiter.wav: High quality audio recording of track 2
 - F0s_1_vn_01_Jupiter.txt: Ground-truth annotations on each frame for audio track 1
 - F0s_2_vc_01_Jupiter.txt: Ground-truth annotations on each frame for audio track 2
 - Notes_1_vn_01_Jupiter.txt: Ground-truth annotations on each played note in audio track 1
 - Notes_2_vc_01_Jupiter.txt: Ground-truth annotations on each played note in audio track 2
 - Sco_01_Jupiter_vn_vc.mid: MIDI score
 - Sco_01_Jupiter_vn_vc.pdf: Sheet score
 - Vid_01_Jupiter_vn_vc.mp4: High quality video recording assembled from single recordings

3.2. File Descriptions

Score

We provide the musical score in two types: MIDI score (.mid) as computer readable format and sheet score (.pdf) for human reading. The sheet score is directly generated from the MIDI score using *Sibelius 7.5* with minor adjustment (clef, key set, note spelling, etc.) for display purpose only. The order of score tracks is arranged musicologically.

Audio

The audio files are in WAVE format with a sampling rate of 48 KHz and bit depth of 24 bits, mono channel. The audio mixture is the direct sum of the individual audio tracks without any rebalance. The order of individual track indices follows the score track order.

Video

The video files are 1080P (1920x1080), with a frame rate of 29.97fps, in MP4 format with H264 codec. The embedded audio is the same as (and synchronized with) the audio mixtures in WAVE format, and compressed into AAC format. Players are rendered horizontally, from left to right, following the order of track indices.

Annotations

All the ground-truth annotations are ASCII delimited text.

Ground-truth annotations on each frame are performed using a frame length of 46ms and hop size of 10ms, where the first column is the frame central time (sec) and the second column is the fundamental frequency (Hz). Silent frames are represented by 0. The data dimension: *Frame Number* \times 2.

Ground-truth annotations on each played note contain the note onset time (sec), note pitch (Hz) and note duration time (sec), which are arranged as the first, second and third columns respectively. The data dimension: *Note Number* \times 3.

3.3. Piece List

| No. | Distinct Abbreviation | Full Piece Name | Type | Duration (mm:ss) | Instrumentations |
|-----|-----------------------|-------------------------------|------|------------------|------------------|
| 01 | Jupiter | Jupiter | Duet | 01:03 | Vn. Vc. |
| 02 | Sonata | Sonata | Duet | 00:46 | Vn. Vn. |
| 03 | Dance | Dance of the Sugar Plum Fairy | Duet | 01:37 | Fl. Cl. |
| 04 | Allegro | Allegro for Musical Clock | Duet | 02:37 | Fl. Fl. |
| 05 | Entertainer | The Entertainer | Duet | 01:27 | Tpt. Tpt. |

| | | | | | | | | |
|----|--------------|----------------------------------|---------|-------|------|------|------|-----------|
| 06 | Entertainer | The Entertainer | Duet | 01:28 | Sax. | Sax. | | |
| 07 | GString | Air on the G string | Duet | 04:30 | Tpt. | Tbn. | | |
| 08 | Spring | Spring from the Four Seasons | Duet | 00:35 | Fl. | Vn. | | |
| 09 | Jesus | Jesus Bleibet Meine Freude | Duet | 03:19 | Tpt. | Vn. | | |
| 10 | March | March from Occasional Oratorio | Duet | 01:43 | Tpt. | Sax. | | |
| 11 | Maria | Ave Maria | Duet | 01:44 | Ob. | Vc. | | |
| 12 | Spring | Spring from the Four Seasons | Trio | 02:11 | Vn. | Vn. | Vc. | |
| 13 | Hark | Hark the herald angels sing | Trio | 00:47 | Vn. | Vn. | Va. | |
| 14 | Waltz | Waltz from sleeping Beauty | Trio | 01:33 | Fl. | Fl. | Cl. | |
| 15 | Surprise | Theme from Surprise Symphony | Trio | 00:53 | Tpt. | Tpt. | Tbn. | |
| 16 | Surprise | Theme from Surprise Symphony | Trio | 00:53 | Tpt. | Tpt. | Sax. | |
| 17 | Nocturne | Nocturne | Trio | 01:36 | Vn. | Fl. | Cl. | |
| 18 | Nocturne | Nocturne | Trio | 01:36 | Vn. | Fl. | Tpt. | |
| 19 | Pavane | Pavane | Trio | 02:13 | Cl. | Vn. | Vc. | |
| 20 | Pavane | Pavane | Trio | 02:13 | Tpt. | Vn. | Vc. | |
| 21 | Rejouissance | La Rejouissance | Trio | 01:16 | Cl. | Tbn. | Tba. | |
| 22 | Rejouissance | La Rejouissance | Trio | 01:16 | Sax. | Tbn. | Tba. | |
| 23 | Rejouissance | La Rejouissance | Trio | 01:16 | Cl. | Sax. | Tba. | |
| 24 | Pirates | Pirates of the Aegean | Quartet | 00:50 | Vn. | Vn. | Va. | Vc. |
| 25 | Pirates | Pirates of the Aegean | Quartet | 00:50 | Vn. | Vn. | Va. | Sax. |
| 26 | King | In the Hall of the Mountain King | Quartet | 01:25 | Vn. | Vn. | Va. | Vc. |
| 27 | King | In the Hall of the Mountain King | Quartet | 01:25 | Vn. | Vn. | Va. | Sax. |
| 28 | Fugue | The Art of the Fugue | Quartet | 02:55 | Fl. | Ob. | Cl. | Bn. |
| 29 | Fugue | The Art of the Fugue | Quartet | 02:52 | Fl. | Fl. | Ob. | Cl. |
| 30 | Fugue | The Art of the Fugue | Quartet | 02:52 | Fl. | Fl. | Ob. | Sax. |
| 31 | Slavonic | Slavonic Dance | Quartet | 01:22 | Tpt. | Tpt. | Hn. | Tbn. |
| 32 | Fugue | The Art of the Fugue | Quartet | 02:54 | Vn. | Vn. | Va. | Vc. |
| 33 | Elise | Fur Elise | Quartet | 00:48 | Tpt. | Tpt. | Hn. | Tbn. |
| 34 | Fugue | The Art of the Fugue | Quartet | 02:54 | Tpt. | Tpt. | Hn. | Tbn. |
| 35 | Rondeau | Rondeau from Abdelazer | Quartet | 02:08 | Vn. | Vn. | Va. | Db. |
| 36 | Rondeau | Rondeau from Abdelazer | Quartet | 02:08 | Vn. | Vn. | Va. | Vc. |
| 37 | Rondeau | Rondeau from Abdelazer | Quartet | 02:08 | Fl. | Vn. | Va. | Cl. |
| 38 | Jerusalem | Jerusalem | Quintet | 01:59 | Vn. | Vn. | Va. | Vc. Db. |
| 39 | Jerusalem | Jerusalem | Quintet | 01:59 | Vn. | Vn. | Va. | Sax. Db. |
| 40 | Miserere | Miserere Mei Deus | Quintet | 00:40 | Fl. | Fl. | Ob. | Cl. Bn. |
| 41 | Miserere | Miserere Mei Deus | Quintet | 00:40 | Fl. | Fl. | Ob. | Sax. Bn. |
| 42 | Arioso | Arioso | Quintet | 04:15 | Tpt. | Tpt. | Hn. | Tbn. Tba. |
| 43 | Chorale | Chorale | Quintet | 00:53 | Tpt. | Tpt. | Hn. | Tbn. Tba. |
| 44 | K515 | String Quintet K515 | Quintet | 03:45 | Vn. | Vn. | Va. | Va. Db. |

Table. 1 List of pieces and the metadata

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|------|-------------|
| Vn. | Violin |
| Va. | Viola |
| Vc. | Cello |
| Db. | Double Bass |
| Fl. | Flute |
| Ob. | Oboe |
| Cl. | Clarinet |
| Sax. | Saxophone |
| Bn. | Bassoon |
| Tpt. | Trumpet |

| | |
|------|----------|
| Hn. | Horn |
| Tbn. | Trombone |
| Tba. | Tuba |

Table. 2 Instrument abbreviations

3.4. Supplementary Files

1. This document
2. The background photos, taken from the Hatch Recital Hall, Eastman School of Music, University of Rochester.
<http://www.esm.rochester.edu/concerts/halls/hatch/>