Computational tools for aiding appreciation of music cultures

Jingju as a test case

Rafael Caro Repetto, **Xavier Serra**
Music Technology Group
Universitat Pompeu Fabra
Barcelona

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Outline

- **Background**
- **Objectives**
- **Work plan**
- **Jingju music**
- **Preliminary outcomes**
  - *Jingju music player*
  - *Comparison of jingju singing lines*
- **Conclusions**

Background

- **Music Technology Group***
  - Focus on music information retrieval (MIR)
  - Interest in culturally aware and corpus driven research
  - Contribute to music understanding

    How can we put our work at the service of the understanding of alien musics?

- **World music education**
  - Abundant literature
    - Jonathan Stock (1996) *World sound matters*
    - Wade and Campbell (2003–2012) *Global music series*
    - Rao, Meer and Harvey (1999) *The Raga Guide*
  - Shortcomings
    - Addressed to official education curricula
    - Requires certain degree of music literacy
    - Gap between the textual description and the audio examples

*Universitat Pompeu Fabra, Barcelona (https://www.upf.edu/web/mtg)

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Objectives

Main goal: developing computational tools for aiding understanding and appreciation of alien music cultures,

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in order to

- reach audience with no music literacy,
- bridge the gap between theoretical explanation and music examples,
- provide self-paced, online study material

Work plan

Music research corpora

- Carnatic music corpus (1650 audio recordings, 346 hours)
- Hindustani music corpus (1096 recordings, 300 hours)
- Ottoman-Turkish makam music corpus (6601 recordings, 420 hours; 2200 music scores)
- Jingju music corpus
- Arab-Andalusian music corpus (164 recordings, 125 hours; 162 music scores)

http://compmusic.upf.edu/

Work plan

From "attentive listening" to "engaged listening" (Campbell 2004)

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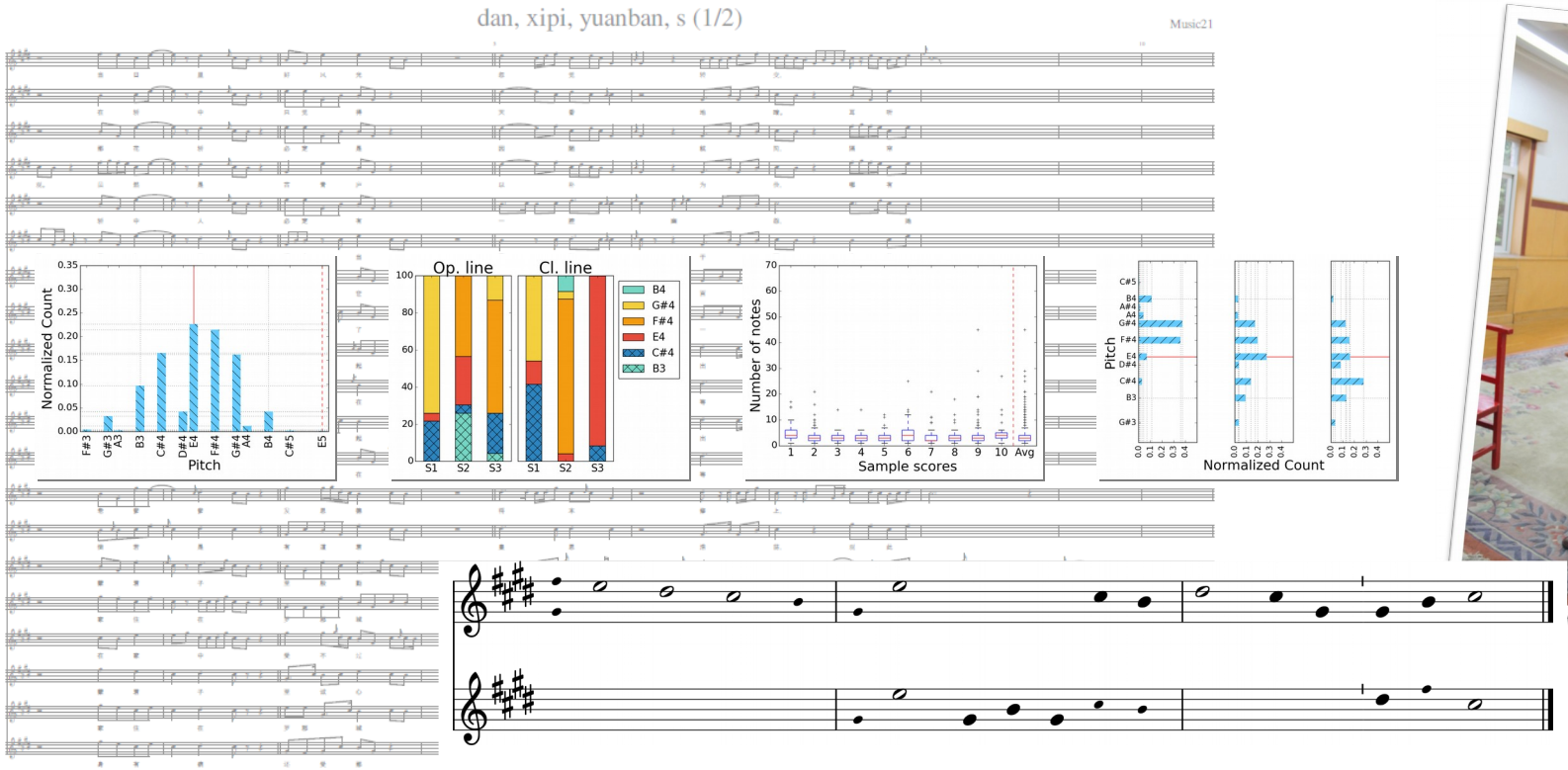
MusicalBridges*

Carnatic, Hindustani, Ottoman-Turkish makam, jingju, Arab-Andalusian

* Funded by RecerCaixa, https://www.upf.edu/web/musicalbridges

Jingju music



中国戏曲学院
National Academy of Chinese Theatre Arts (Beijing)

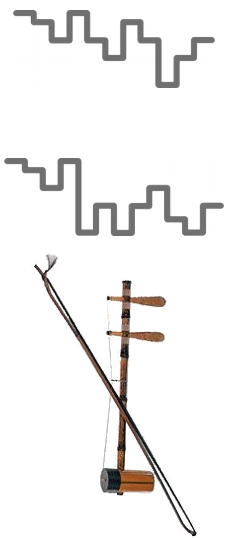
Jingju music

couplet

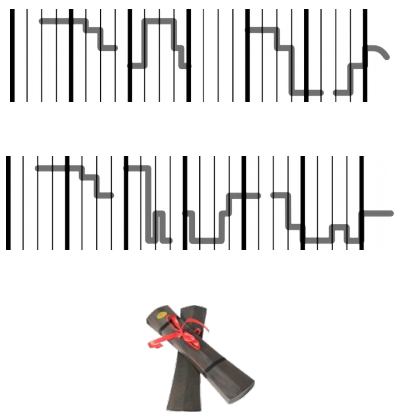
老爹爹　发恩德　将本修上，

明早朝　上金殿　面奏吾皇。

shengqiang



banshi



role type

Jingju music

Jingju Music Corpus

- **Jingju Audio Recordings Collection** (1249 recordings, 123 hours)
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- **Jingju Lyrics Collection** (850 plays, 2163 scripts)
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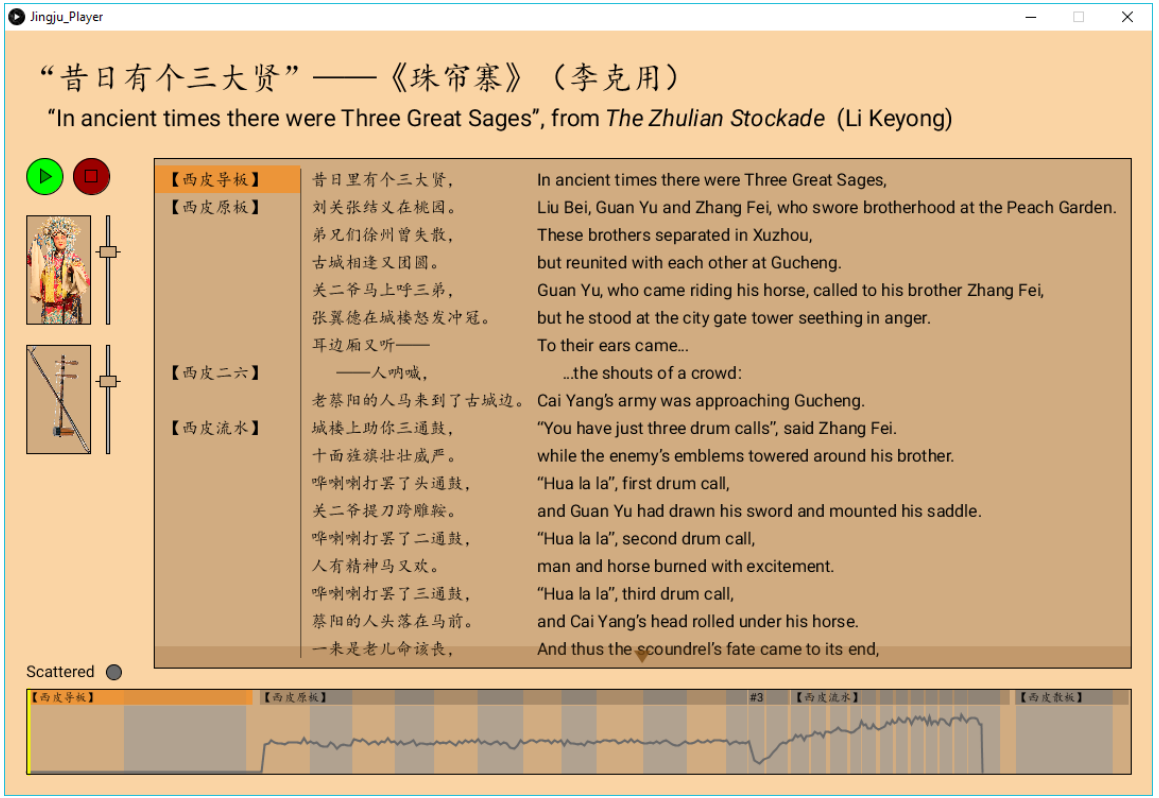
Preliminary results: *Jingju music player*



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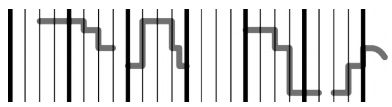
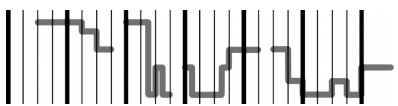




role type

Preliminary results: *Jingju music player*

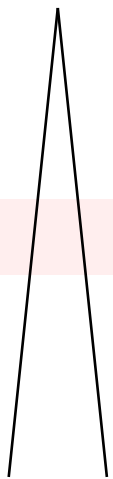
慢板 *manban* (‘slow’)

原板 *yuanban* (‘original’)

快板 *kuaiban* (‘fast’)

散板 *sanban* (‘scattered’)

Preliminary results: *Jingju music player*

	tempo	meter	expressive function
慢板 *manban* (‘slow’)		一板三眼 *1 ban, 3 eyes* (4/4)	calm, introspection
原板 *yuanban* (‘original’)		一板一眼 *1 ban, 1 eye* (2/4)	narration, conversation
快板 *kuaiban* (‘fast’)		有板无眼 *ban, no eyes* (1/4)	anger, fear
散板 *sanban* (‘scattered’)		无板无眼 *no ban, no eyes* (free)	emotional

Preliminary results: *Jingju music player*

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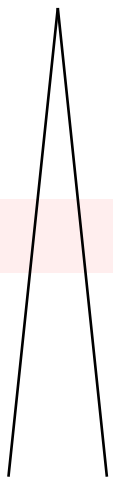
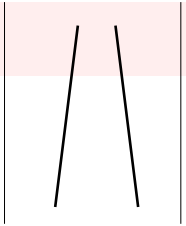
慢板 *manban* (‘slow’)		一板三眼 *1 ban, 3 eyes* (4/4)	calm, introspection
中三眼 *zhongsanyan*		一板三眼 *1 ban, 3 eyes* (4/4)	introspective narration
快三眼 *kuaisanyan*		一板三眼 *1 ban, 3 eyes* (4/4)	calm narration
原板 *yuanban* (‘original’)		一板一眼 *1 ban, 1 eye* (2/4)	narration, conversation
二六 *erliu*		一板一眼 *1 ban, 1 eye* (2/4)	expectation
流水 *liushui*		有板无眼 *ban, no eyes* (1/4)	agitation
快板 *kuaiban* (‘fast’)		有板无眼 *ban, no eyes* (1/4)	anger, fear
散板 *sanban* (‘scattered’)		无板无眼 *no ban, no eyes* (free)	emotional
摇板 *yaoban*		无板无眼 *no ban, no eyes* (free)	inner agitation
导板 *daoban*		无板无眼 *no ban, no eyes* (free)	emotional outburst

Preliminary results: *Jingju music player*

“ 昔日有个三大贤”——《珠帘寨》（李克用）
“In ancient times there were Three Great Sages”,
from *The Zhulian Stockade* (Li Keyong)

原板 *yuanban* (‘original’)		一板一眼 *1 ban, 1 eye* (2/4)	narration, conversation
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*http://doi.org/10.5281/zenodo.1245942

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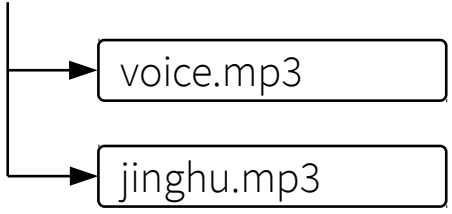

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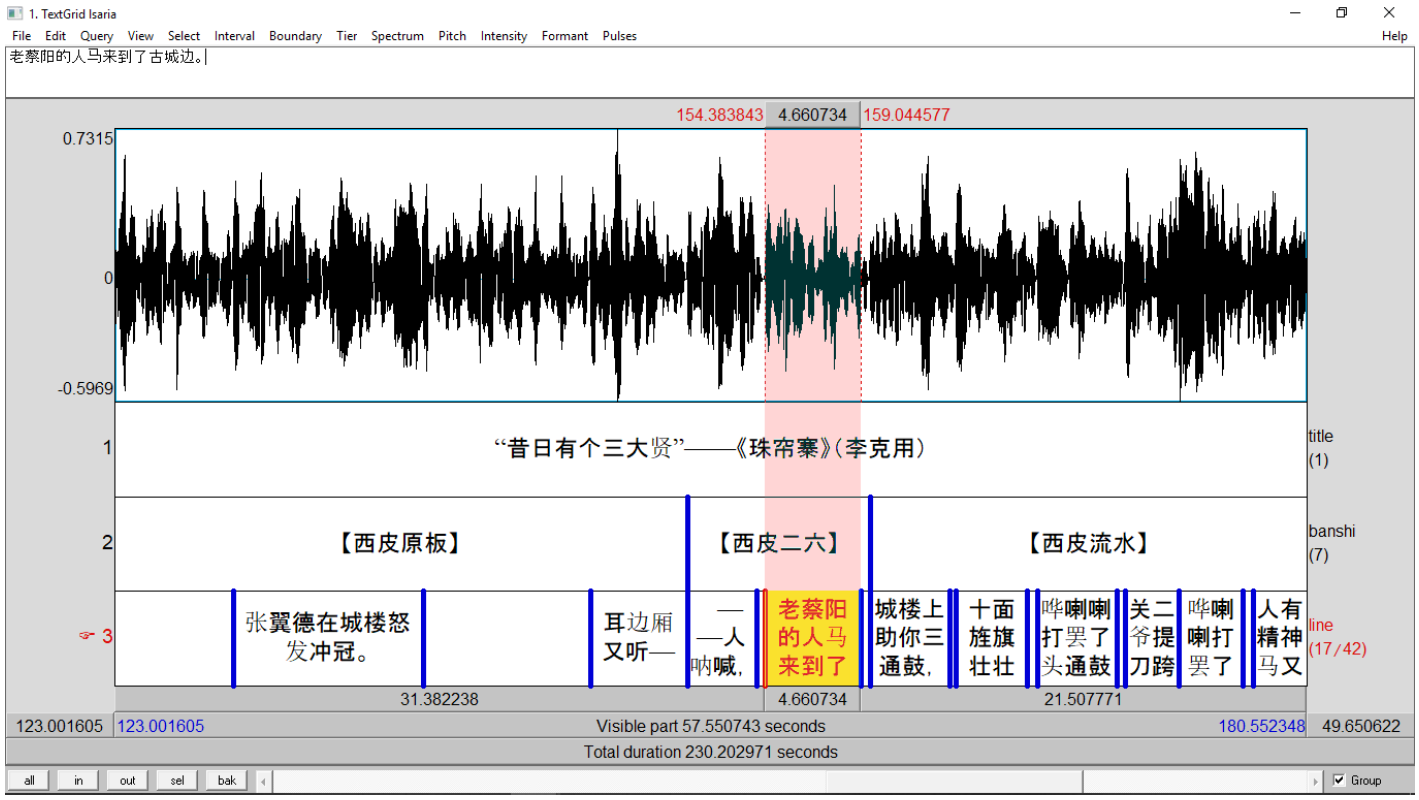
Preliminary results: *Jingju music player*

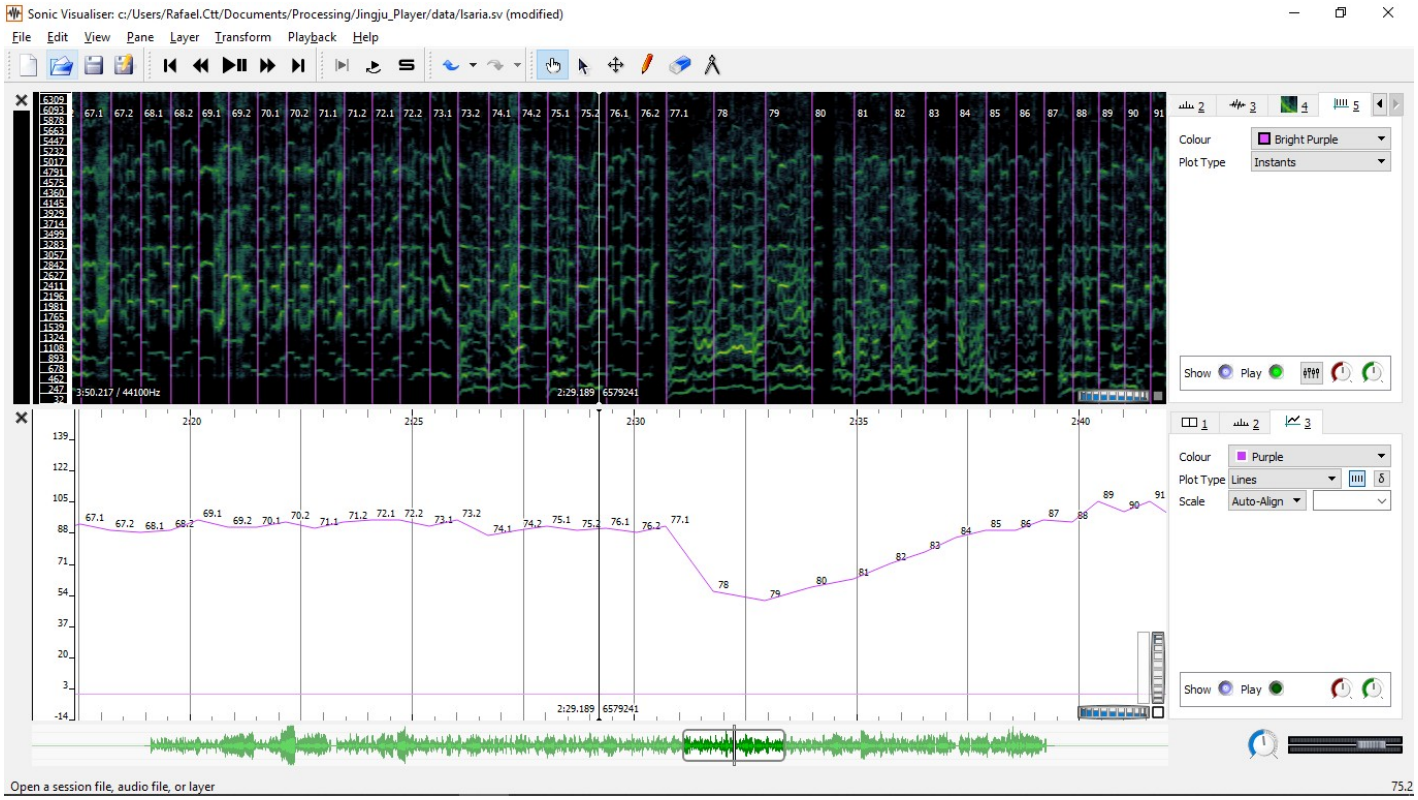
Praat



*http://www.fon.hum.uva.nl/praat/

Preliminary results: *Jingju music player*

Sonic Visualizer



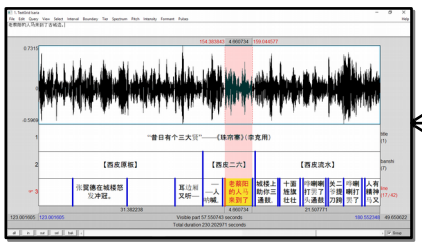
*https://www.sonicvisualiser.org/

Preliminary results: *Jingju music player*

Jingju *a Cappella* Recordings Collection

voice.mp3

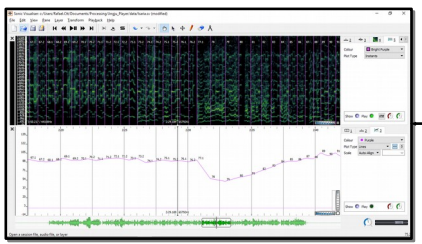
jinghu.mp3



lines.csv

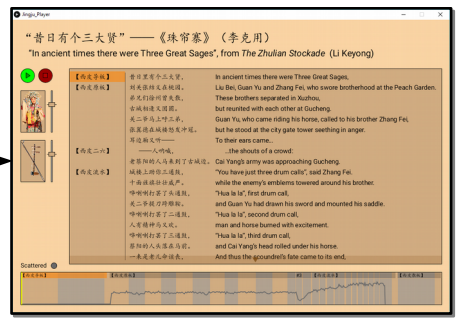
banshi.csv

title.csv



tempo-curve.csv

Processing*



*https://processing.org/

Preliminary results: *Jingju music player*

Conclusions

- **Potential**
  - Easy visualization of an aria's structure in terms of *banshi* and lyrics lines
  - Concrete visualization of tempo changes and its relationship with *banshi*
  - Interactivity: navigation, source selection
  - Engaged listening: metre following guided by the light signal

Preliminary results: *Jingju music player*

Conclusions

- **Shortcomings**
  - No longer support for embedding in a web page
  - Limited sources

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- **Improvements**
  - Recode it in P5.js*
  - Add visualization of pitch and dynamics

*https://p5js.org/

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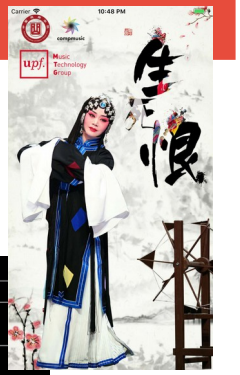
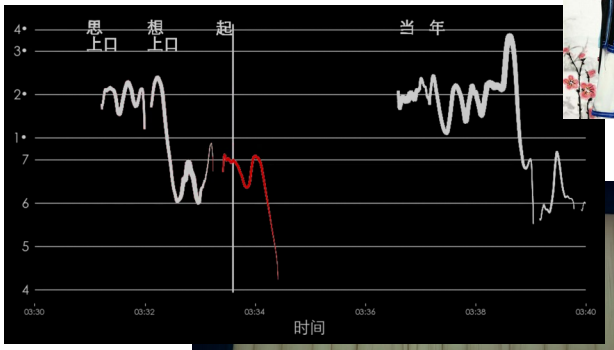
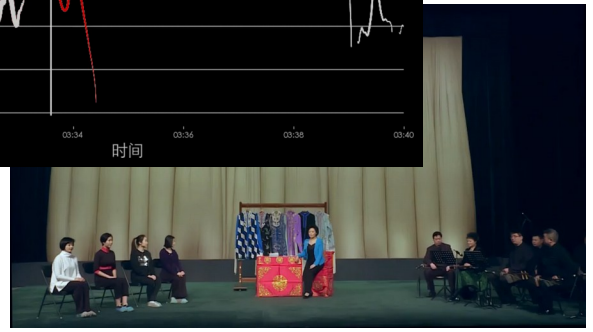
《生死恨》

Regrets of Life and Death

(iPhone app)



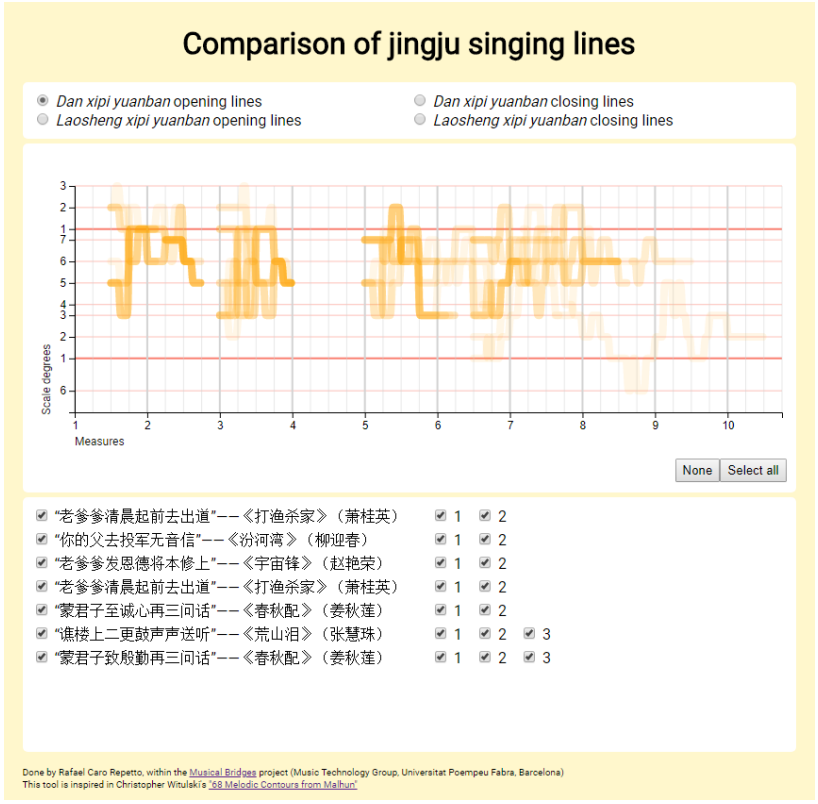




"Research on multimedia and computer aided education of Mei Lanfang's style of singing,"*
PI Zhang Jing, National Academy of Chinese Theatre Arts

*Funded by Academy of Social Sciences of Beijing

Preliminary results: *Comparison of jingju singing lines*



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couplet

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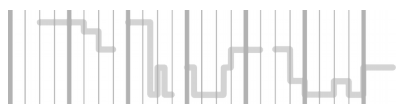

role type

Preliminary results: *Comparison of jingju singing lines*

couplet | ***shengqiang*** | *banshi* | role type

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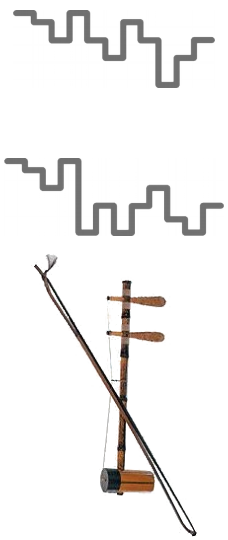
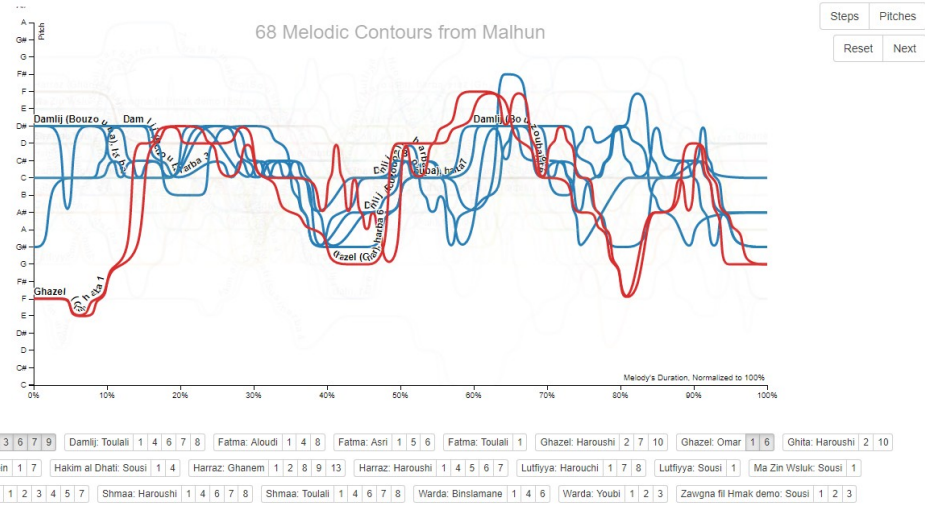


Christopher Witulski's "68 Melodic Contours from Malhun"*



*https://cjwit.github.io/malhun-contour/index.html

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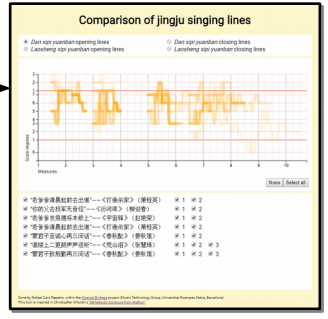
	A	B	C	D	E	F	G	H
1	daeh-CanQiQi-WuLongZuo.xml	dan	erhuang	manban	s1	惨凄凄唤苍天天不应响，	12	65
2		dan	erhuang	manban	x	叹红颜多薄命父母双亡。	84	121
3		dan	erhuang	manban	s1	千金休哪曾受磨房景况，	136	201
4		dan	erhuang	manban	x	担几肩头晕转体若筛糠。	236	261
5	daeh-LiYanFei-DaBaoGuo.xml	dan	erhuang	manban	s1	李艳妃设早朝龙书案下，	0	41
6		dan	erhuang	manban	x	文站东武列西朝贺哀家。	42	74
7		dan	erhuang	manban	s1	太师爷奏一本进贡年下，	75	100
8		dan	erhuang	manban	x	各国的众王侯朝贺中华。	104	122
9		dan	erhuang	manban	s2	将江山让太师权且代贺，	124	140
10		dan	erhuang	manban	x	候幼主成了龙原业归家。	144	161.75
11		dan	erhuang	manban	s2	写文约我且把玉玺打下，	164	196
12		dan	erhuang	manban	x	宣太师上金殿披红插花。	197	237
13		dan	erhuang	manban	s1	赐你的上方剑朝房问话，	238	263
14		dan	erhuang	manban	x	压定了文武臣均要画押。	267	292.5
15	daeh-LiYanFei-ErJinGong.xml	dan	erhuang	zhongsanyan	s1	李艳妃坐昭阳自思自想，	15	52
16		dan	erhuang	zhongsanyan	x	想起了朝中事好不惨伤！	55	87.5
17		dan	erhuang	zhongsanyan	s1	耳边厢又听得朝靴响亮，	103	140
18		dan	erhuang	zhongsanyan	x	想必是徐杨将进了昭阳。	143	160
19		dan	erhuang	zhongsanyan	s2	有几句话儿我不好言讲，	163	180
20		dan	erhuang	zhongsanyan	x	我只得怀抱太子两泪汪汪口口声声哭的是先王。	183	227.5
21	daeh-NaRiFeng-YuanXiaoMi.xml	dan	erhuang	yuanban	s1	那日风波平地起，	17	41.5
22		dan	erhuang	yuanban	x	死里逃生甚惨凄。	43	51.5
23		dan	erhuang	yuanban	s2	舅父前来出主意，	53	59.5
24		dan	erhuang	yuanban	x	我与母亲两分离。	61	81
25		dan	erhuang	yuanban	s1	母女隔断三千里，	91	115.5
26		dan	erhuang	yuanban	x	那厢流泪这厢啼。	117	125.5
27		dan	erhuang	yuanban	s2	我今绝少人生趣，	127	145.5
28		dan	erhuang	yuanban	x	不如早死命归西。	165	183
29	daeh-NuZiYou-TouJunBieYao.xml	dan	erhuang	manban	s1	奴自幼在闺阁娇生惯养，	0	41
30		dan	erhuang	manban	x	为薛郎我父女断绝情长。	42	78
31		dan	erhuang	manban	s1	但愿得去投军功名有望，	79	120
32		dan	erhuang	manban	x	也不枉我一人苦度时光	121	140

music21[1]

singing-lines.json

D3.js[2]



[1] http://web.mit.edu/music21/ [2] https://d3js.org/

Preliminary results: *Comparison of jingju singing lines**

Conclusions

- **Potential**
  - Intuitive comparison of jingju melodic line types
  - Visualization of metric position of lyrics
  - Interactivity: selection of lines
  - Similar tool for analysis of heterophony

* https://rafael-caro.github.io/jingju-melodies-comparison/

Preliminary results: *Comparison of jingju singing lines**

Conclusions

- **Shortcomings**
  - No music
  - No options for engaged listnening
  - Doesn't work in Internet Explorer
  - Limited sources

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Preliminary results: *Comparison of jingju singing lines**

Conclusions

- **Shortcomings**
  - No music
  - No options for engaged listnening
  - Doesn't work in Internet Explorer
  - Limited sources
- **Improvements**
  - Add a midi version of the lines
  - Add more line types

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Conclusions

Potential

- Bridge the gap between theory and sound by visualization
- Materialization of musical elements → interaction
- Accessibility online → self-pacing
- Availability of corpora

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Challenges, future work

- Not satisfactory results of state of the art MIR technologies
- Limited sources
- Design a methodology for evaluation

Computational tools for aiding appreciation of music cultures

Jingju as a test case

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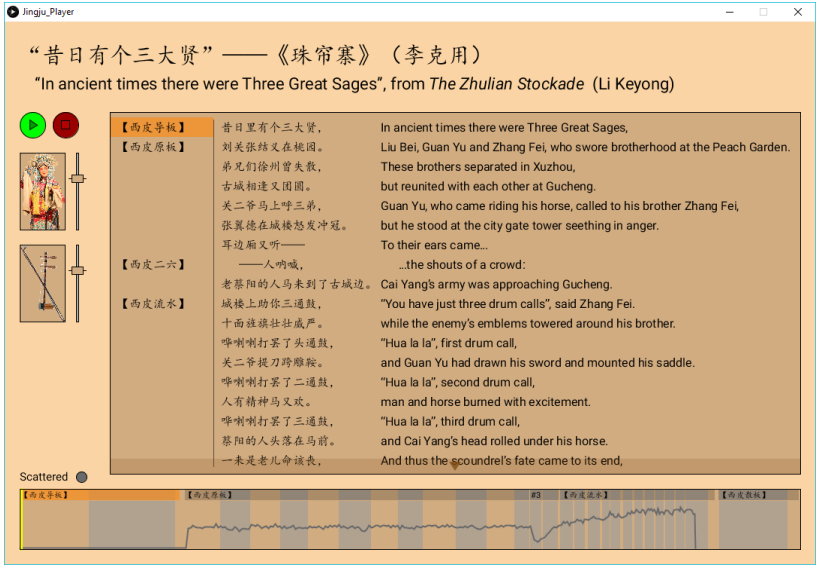

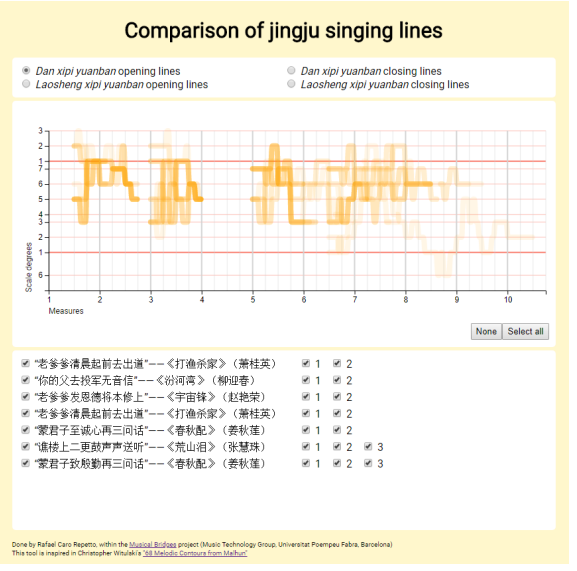

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