

# Computational tools for assisting teaching of alien music traditions

The Musical Bridges project

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# Outline

- Background
- Objectives
- Work plan
- *Use case: the jingju music player*
- *Case overview: Hindustani art music*
- Conclusions

# Background

- **Music Technology Group\***

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

*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



# Musical Bridges





# Objectives

- **Developing computational tools for aiding understanding and appreciation of alien music cultures**
  - to develop listenership, no musicianship (Elliott and Sivlerman, 2015),
  - to reach the broadest audience (no music literacy),
  - to bridge the gap between theoretical explanation and music examples
    - visualization e interaction
    - from “attentive listening” to “engaged listening” (Campbell 2004)
  - to provide self-paced, online study material
- **Design (on-site, on-line) courses to evaluate these tools**

# Work plan

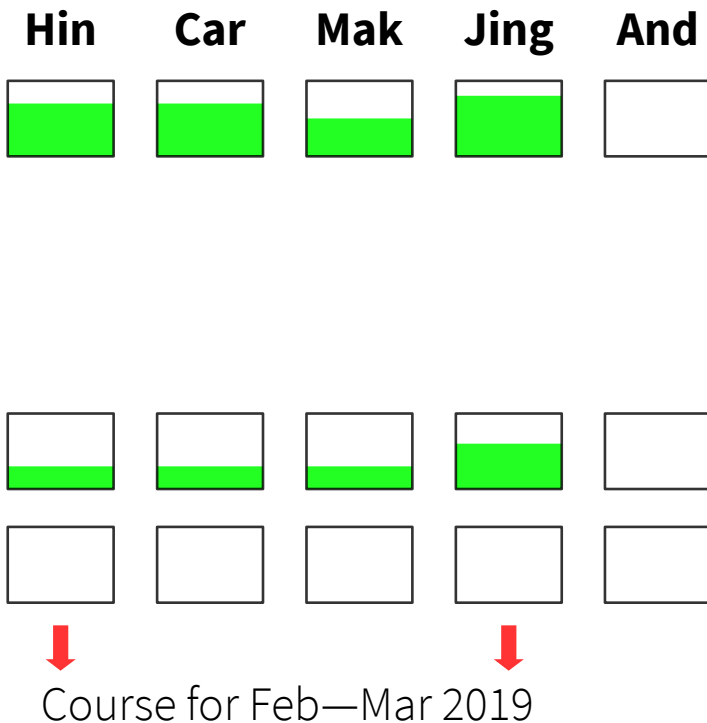


## Music research corpora

- 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 (1249 recordings, 123 hours)
- Arab-Andalusian music corpus (164 recordings, 125 hours; 162 music scores)

# Work plan

- Identify **elements** of these music traditions that can be experienced
  - through computational tools
  - using the available data
- Develop culturally specific, interactive, on-line **tools**
- Design an evaluation **method**

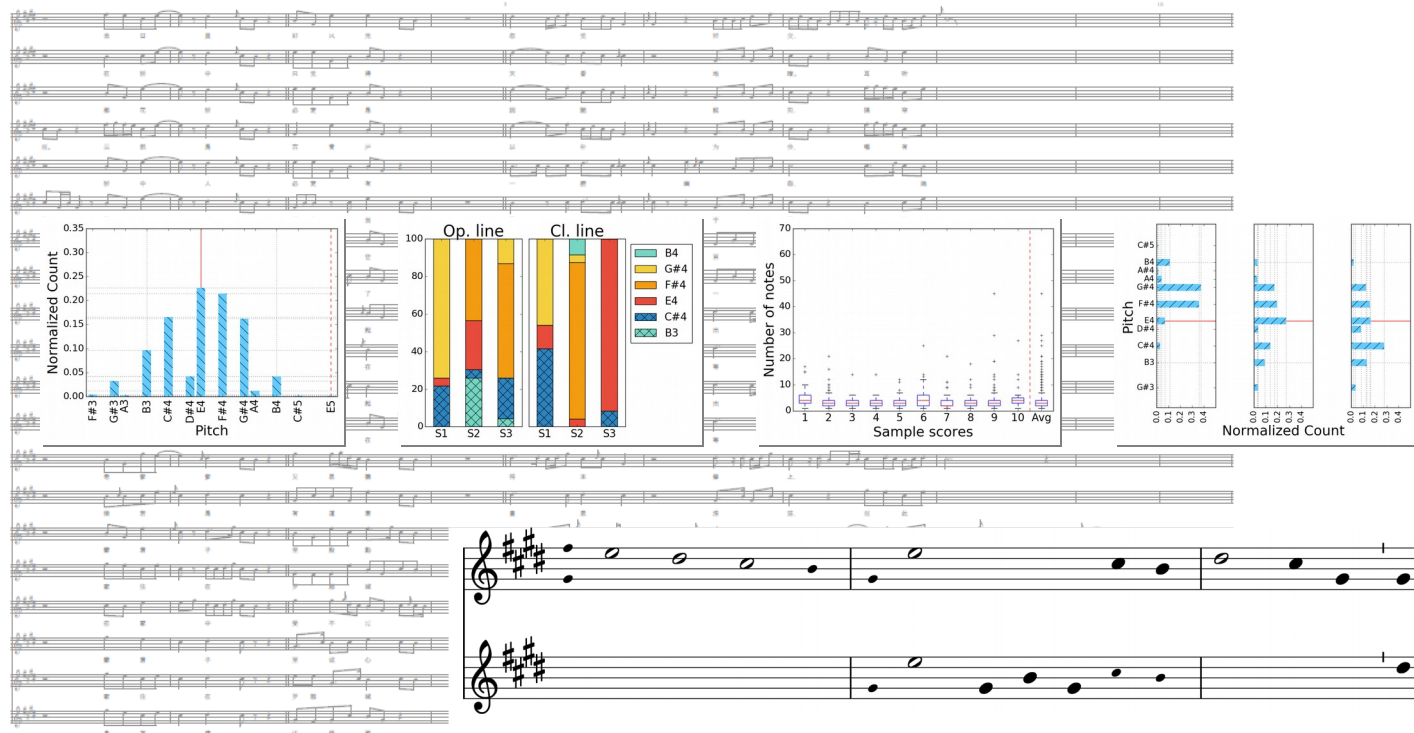


## *Use case: the jingju music player*

# Use case: the jingju music player

dan, xipi, yuanban, s (1/2)

Music21



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

# Use case: the jingju music player

## couplet

老爹爹 发恩德 将本修上，

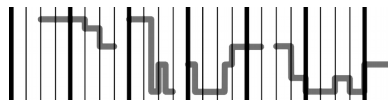
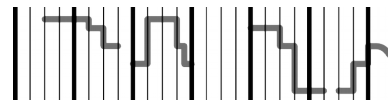
明早朝 上金殿 面奏吾皇。



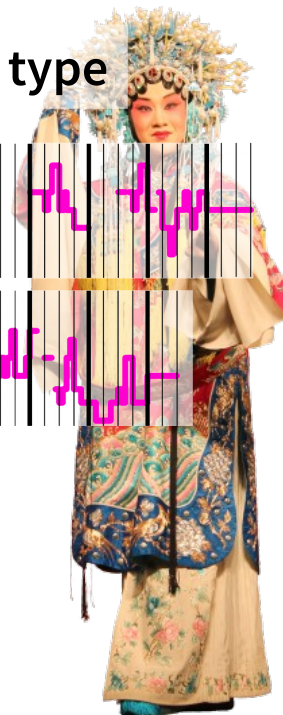
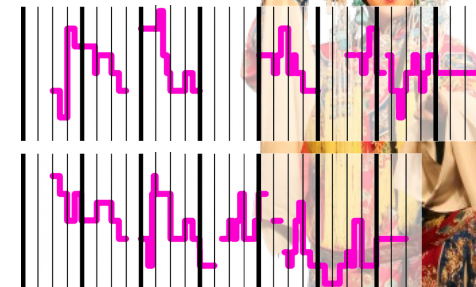
## shengqiang



## banshi



## role type



# Use case: the jingju music player

couplet

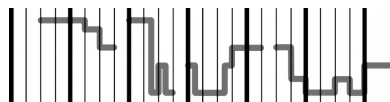
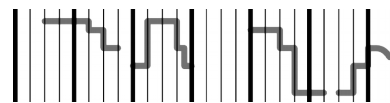
老爹爹 发恩德 将本修上，

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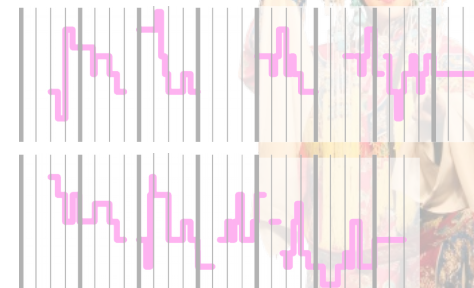
*shengqiang*



*banshi*



role type



## Use case: the jingju music player

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



## Use case: the 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')

二六 *erliu*

流水 *liushui*



一板一眼 *1 ban, 1 eye* (2/4)

一板一眼 *1 ban, 1 eye* (2/4)

有板无眼 *ban, no eyes* (1/4)

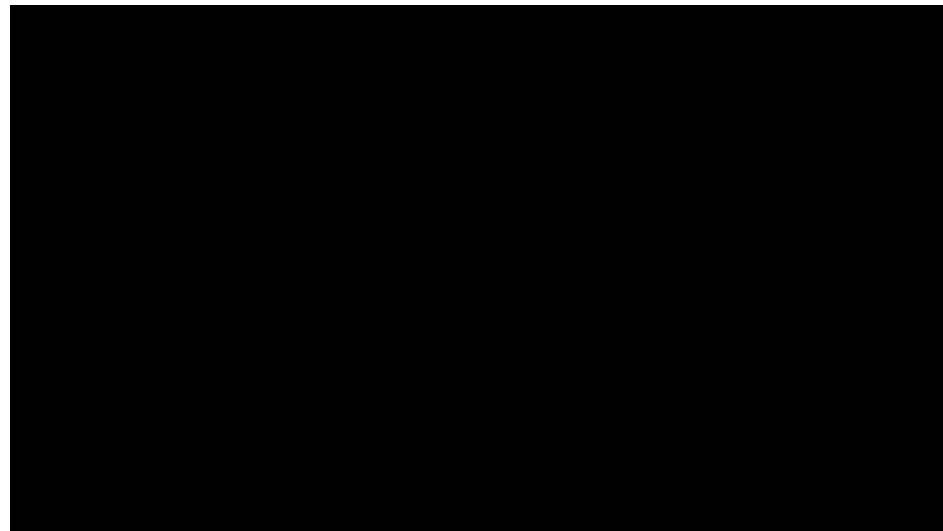
narration, conversation

expectation

agitation

## Use case: the jingju music player

“昔日有个三大贤”——《珠帘寨》（李克用）  
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一板一眼 *1 ban, 1 eye* (2/4)

有板无眼 *ban, no eyes* (1/4)

narration, conversation


expectation


agitation



# Use case: the jingju music player

Jingju\_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)

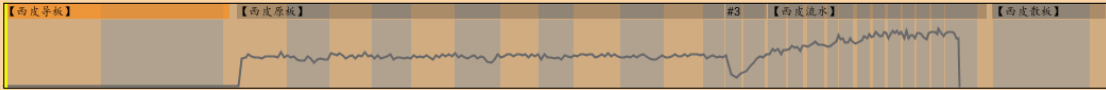
 

【西皮导板】	昔日里有个三大贤，	In ancient times there were Three Great Sages,
【西皮原板】	刘关张结义在桃园。	Liu Bei, Guan Yu and Zhang Fei, who swore brotherhood at the Peach Garden.
	弟兄们徐州曾失散，	These brothers separated in Xuzhou,
	古城相逢又团圆。	but reunited with each other at Gucheng.
	关二爷马上呼三弟，	Guan Yu, who came riding his horse, called to his brother Zhang Fei,
	张翼德在城楼怒发冲冠。	but he stood at the city gate tower seething in anger.
	耳边厢又听——	To their ears came...
	——人呐喊，	...the shouts of a crowd:
【西皮二六】	老蔡阳的人马来到了古城边。	Cai Yang's army was approaching Gucheng.
【西皮流水】	城楼上助你三通鼓，	"You have just three drum calls", said Zhang Fei.
	十面旌旗壮威严。	while the enemy's emblems towered around his brother.
	哗啦啦打罢了头通鼓，	"Hua la la", first drum call,
	关二爷提刀跨雕鞍。	and Guan Yu had drawn his sword and mounted his saddle.
	哗啦啦打罢了二通鼓，	"Hua la la", second drum call,
	人有精神马又欢。	man and horse burned with excitement.
	哗啦啦打罢了三通鼓，	"Hua la la", third drum call,
	蔡阳的人头落在马前。	and Cai Yang's head rolled under his horse.
	一来是老儿命该丧，	And thus the scoundrel's fate came to its end,

Scattered ●

【西皮导板】 【西皮原板】 #3 【西皮流水】 【西皮散板】



## *Use case: the jingju music player*

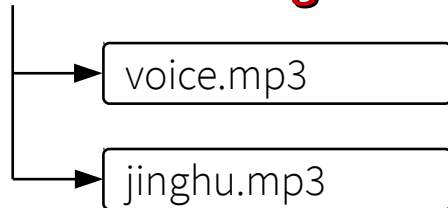
### Jingju Music Corpus

- **Jingju Audio Recordings Collection** (1249 recordings, 123 hours)
- **Jingju Music Scores Collection** (92 scores, 897 melodic lines)
- **Jingju Lyrics Collection** (850 plays, 2163 scripts)
- **Jingju *a Cappella* Recordings Collection** (226 voice recordings, 69 jinghu recordings)

## Use case: the jingju music player

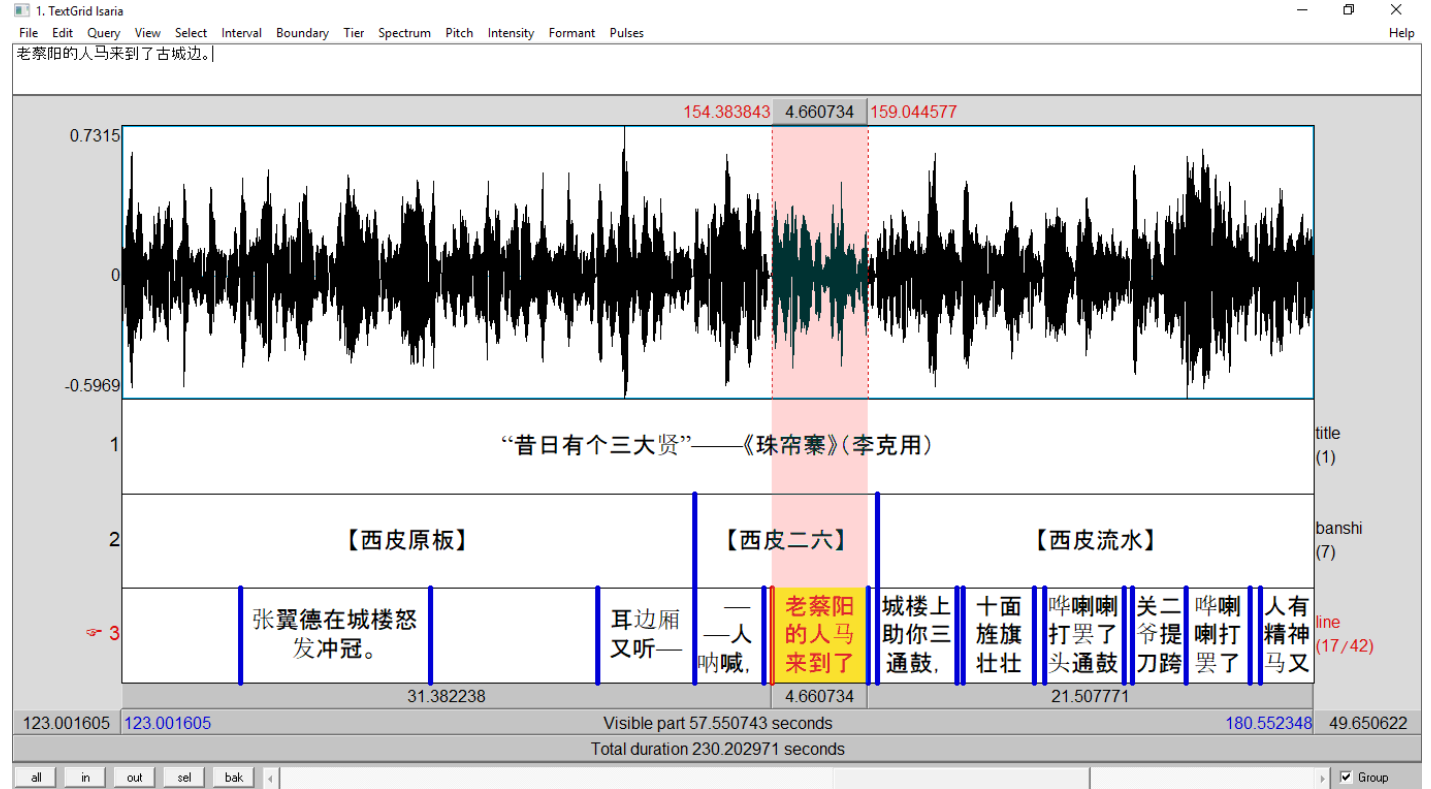
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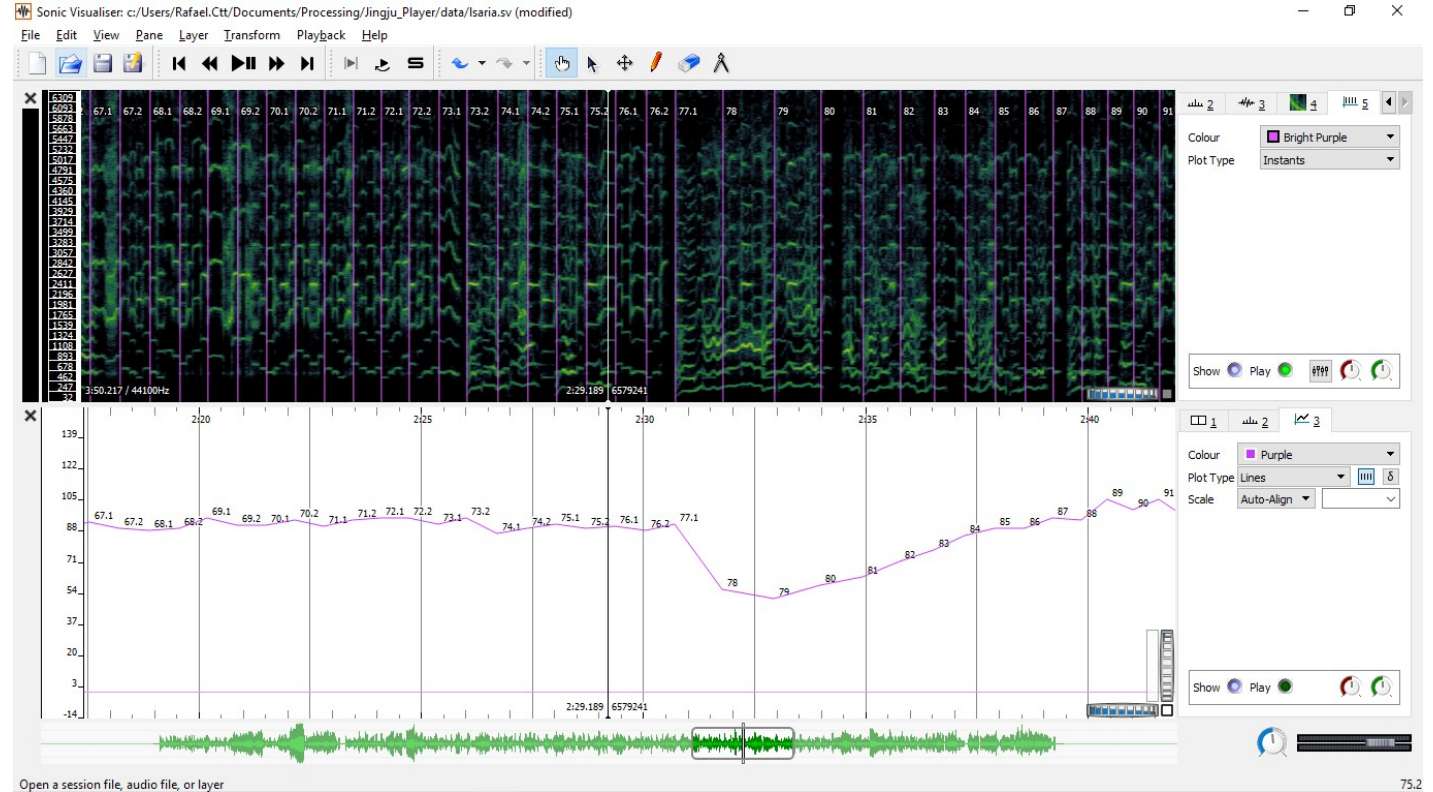
# Use case: the jingju music player

## Praat

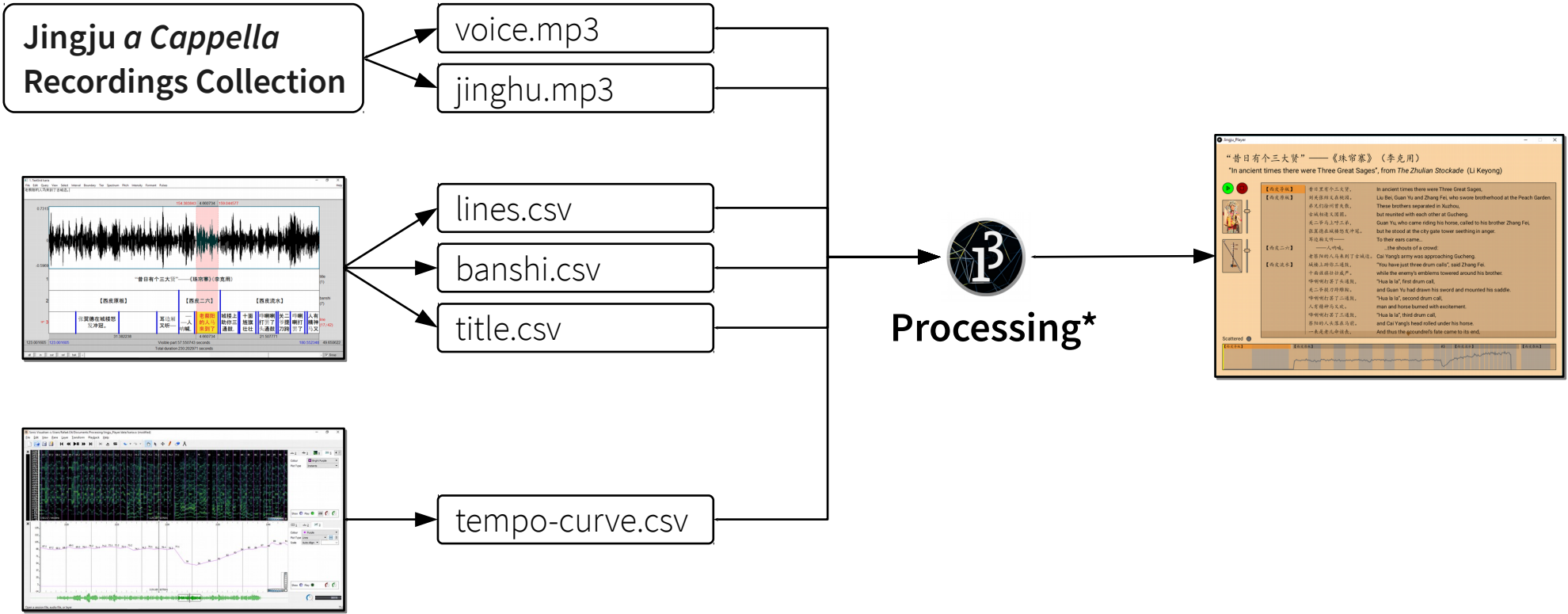


# Use case: the jingju music player

## Sonic Visualizer



# Use case: the jingju music player





## *Use case: the jingju music player*

- **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

## *Use case: the jingju music player*

- **Shortcomings**

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

- **Improvements**

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

## Use case: the jingju music player

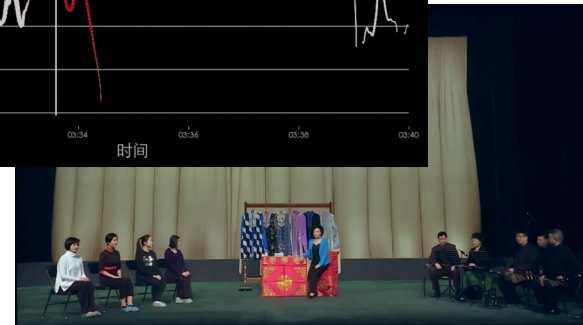
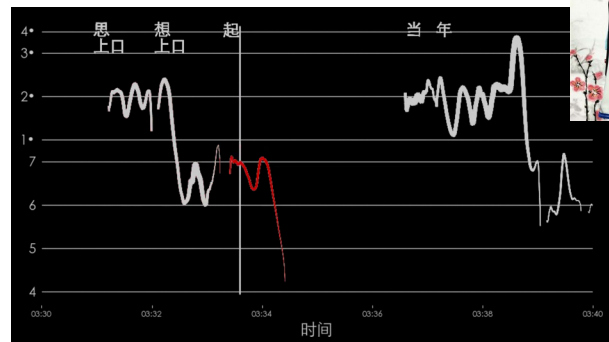
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- **Improvements**

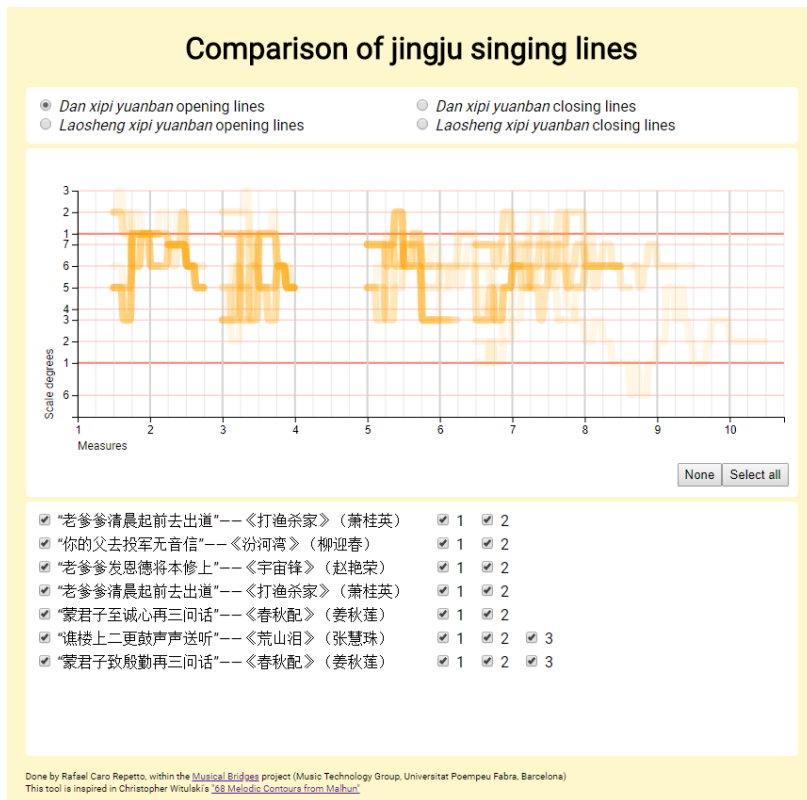
- Recode it in P5.js\*
- Add visualization of pitch and dynamics

### 《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

# Use case: jingju melodic lines comparison



## Case overview: Hindustani art music

	“ <b>Sa</b> -ng along”	Tāla	Rāga
isolated	Sing <i>sa</i> from tanpura (Data: Freesound <b>acoustic</b> and <b>electronic</b> tanpura packs)	Clap/wave along a generated cycle <b><i>Tinysinth</i></b> *	
in performance	Sing <i>sa</i> from recroding (Data: manual <i>sa</i> annotations for 108 recordings)		

# Case overview: Hindustani art music

Sandbox Mode **Hindustani** Carnatic Turkish

## tinysynth

Loop Length: 16

Preset Selector  
Tintal ▾

[tabla-dha](#)

[tabla-tin](#)

[tabla-na](#)

[tabla-dhin](#)

BPM 200

Records rectangular

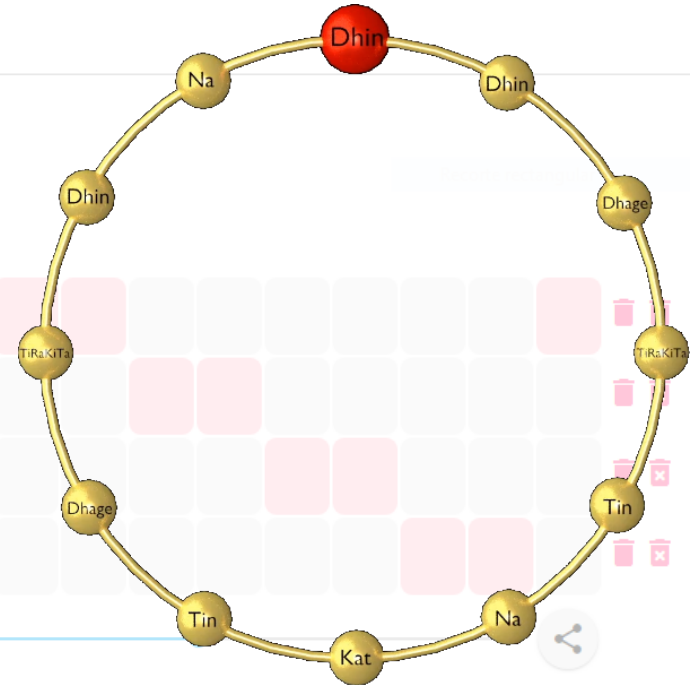
# Case overview: Hindustani art music



tabla-dhin



BPM 200



## Case overview: Hindustani art music

	“ <b>Sa</b> -ng along”	Tāla	Rāga
isolated	Sing <i>sa</i> from tanpura (Data: Freesound <b>acoustic</b> and <b>electronic</b> tanpura packs)	Clap/wave along a generated cycle <b><i>Tinysinth</i></b> *	(Computationally extracted scale?)
in performance	Sing <i>sa</i> from recording (Data: manual <i>sa</i> annotations for 108 recordings)	Clap/wave along a recording (Data: manual <i>sam</i> annotations for 108 recordings)	(Scale annotated pitch track?) <b><i>(Dunya)</i></b>




# Conclusions

## Potential

- Bridge the gap between theory and sound by visualization
- Interactivity and self-pacing, hopefully engaged listening
- Availability of data and tools

## Challenges, future work

- Not satisfactory results of state of the art MIR technologies
- Design a methodology for evaluation
  -  \*
  - Gamification

# Computational tools for assisting teaching of alien music traditions

## The Musical Bridges project

**Rafael Caro Repetto** (rafael.caro@upf.edu), **Xavier Serra** (xavier.serra@upf.edu)

Music Technology Group, Universitat Pompeu Fabra, Barcelona



A screenshot of the Inqo Player software interface. The window title is "Inqo\_Player". The main content area displays the title "“昔日有个三大贤”——《珠帘寨》（李克用）" and its English translation "“In ancient times there were Three Great Sages”, from The Zhulian Stockade (Li Keyong)". Below the title, there are three columns of text: Chinese lyrics, a Spanish translation, and an English translation. The interface includes a play button, a progress bar, and a waveform visualization at the bottom.

A screenshot of the tinsynth software interface. The window title is "tinsynth". The interface shows a "Sandbox Mode" tab selected, with "Hindustani", "Carnatic", and "Turkish" tabs. Below the tabs, there are four rows of controls for different instruments: "tabla-dha", "tabla-dn", "tabla-na", and "tabla-dhn". Each row has a "Preset Selector" dropdown menu and a "Tintal" dropdown menu. A "Loop Length: 16" control is visible. At the bottom, there is a BPM control set to 200 and a play button.