a Platform to Explore Pitch Scales in Non-Western and Western Music

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Outline

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- Goal
- Dataset

Methodology
- Design
- Tarsos, inner workings

Demo

Context Analysis

Conclusions

Introduction

Research goal:

Provide **culture independent access to** archives with **ethnic music** that deal with a large variability of musical content, users, search intentions and expectations in a multidisciplinary approach, **combining musicology and engineering**.

Introduction

RMCA (Royal Museum for Central Africa), Belgium

DEKKMMA:

Audio:

- 50.000 sound recordings
- 3.000 hours of music
- 33.000 items digitized.

Meta-data:

- 35.000 items digitized

Contextual data

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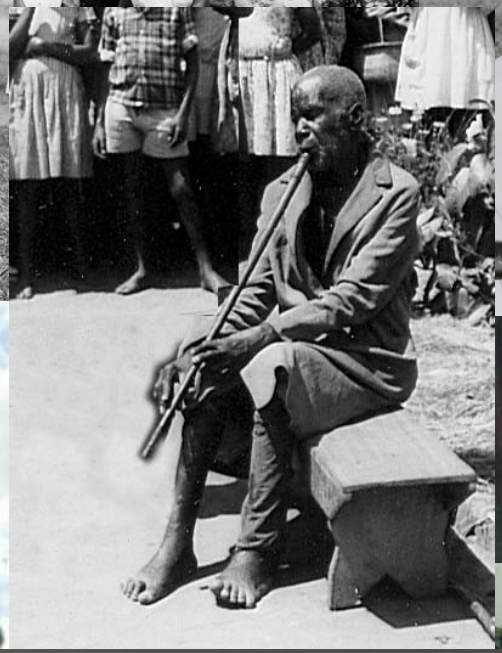
database and website:

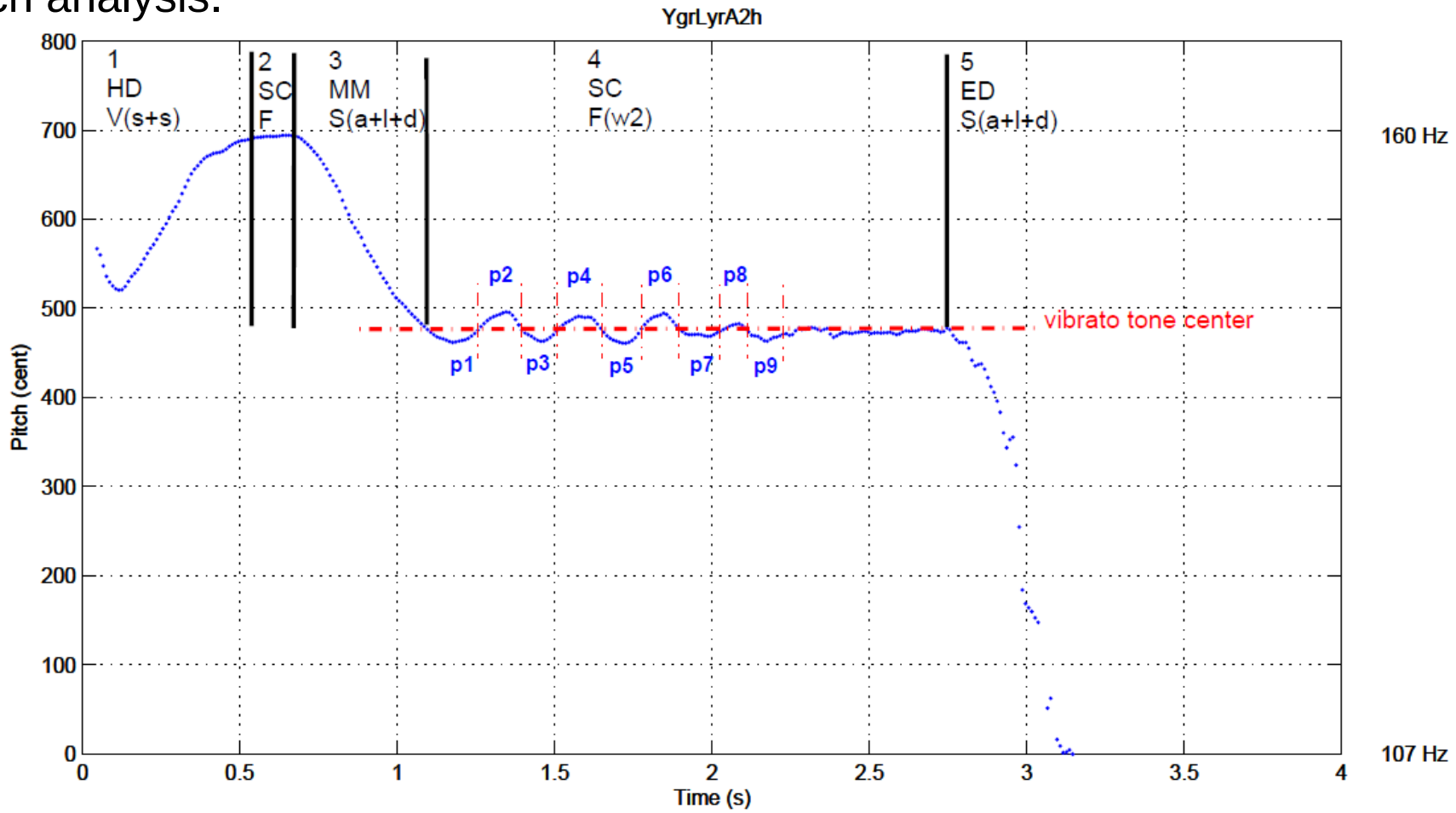
http://music.africamuseum.be



Introduction

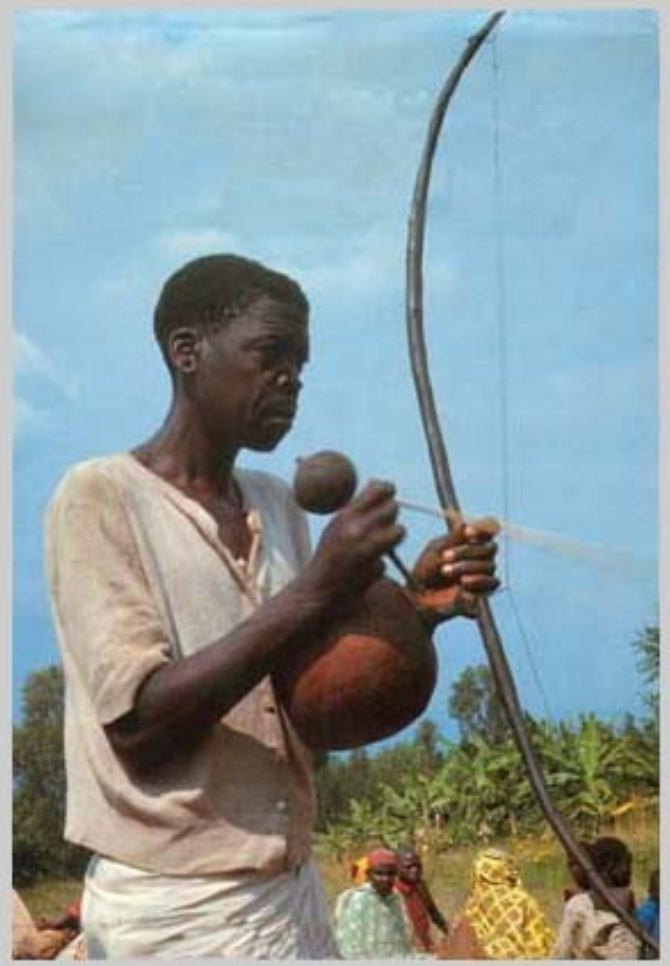
Current MIR approach: a tone is an object with a single pitch, represented as a note.

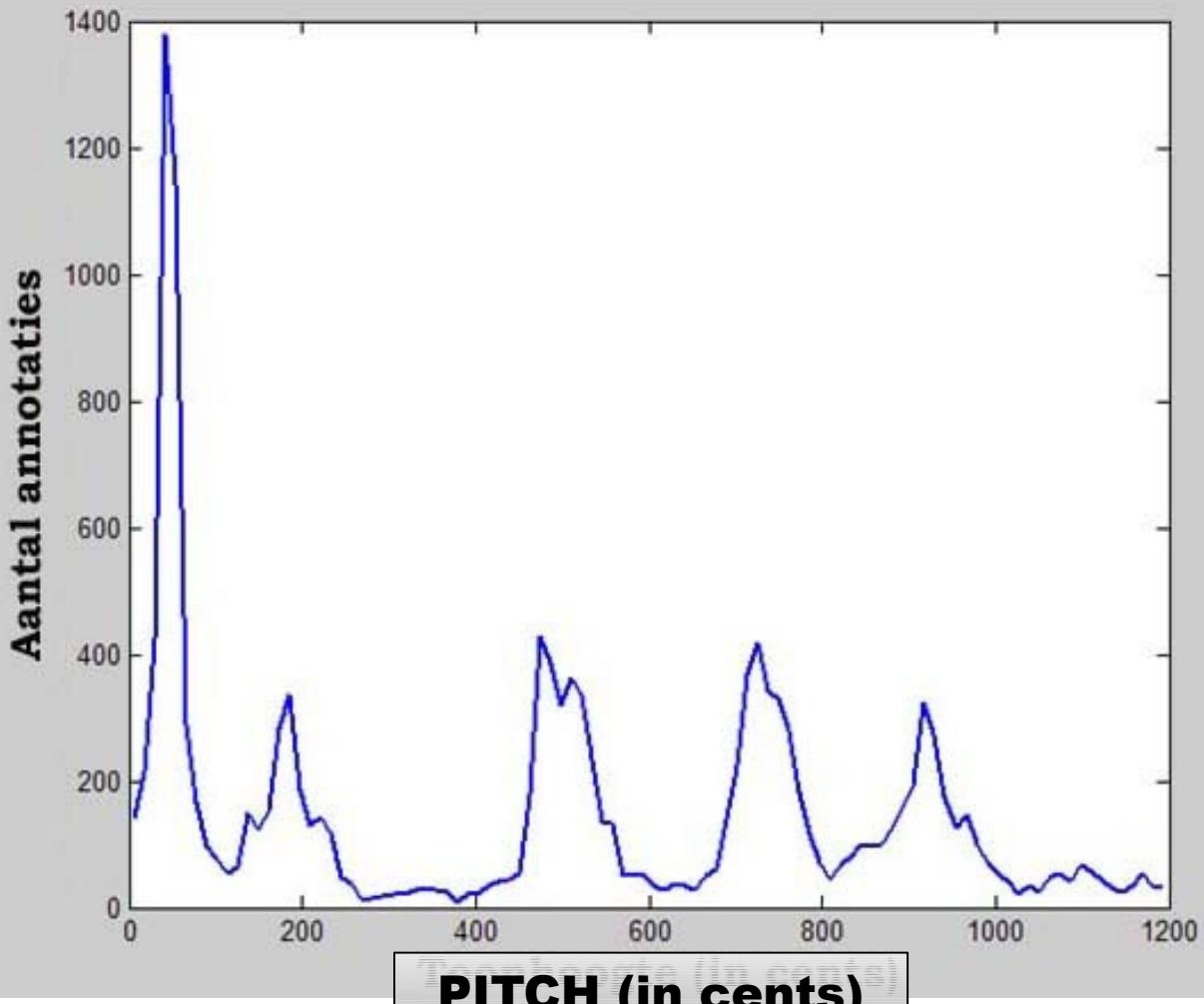
Non-western tuning systems vary a lot and require different strategies for pitch analysis.



Introduction

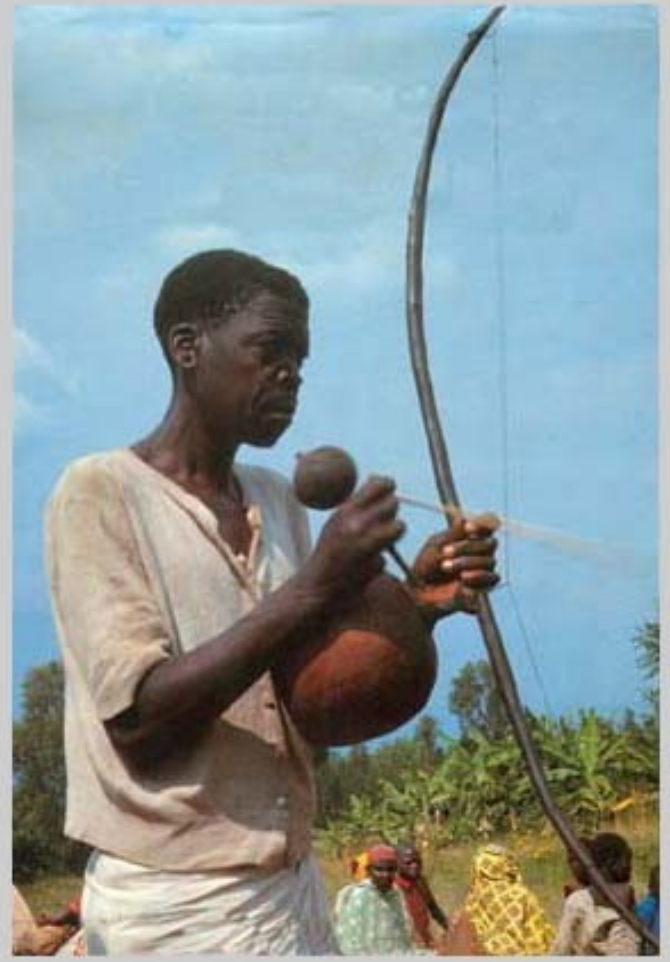
Annotations

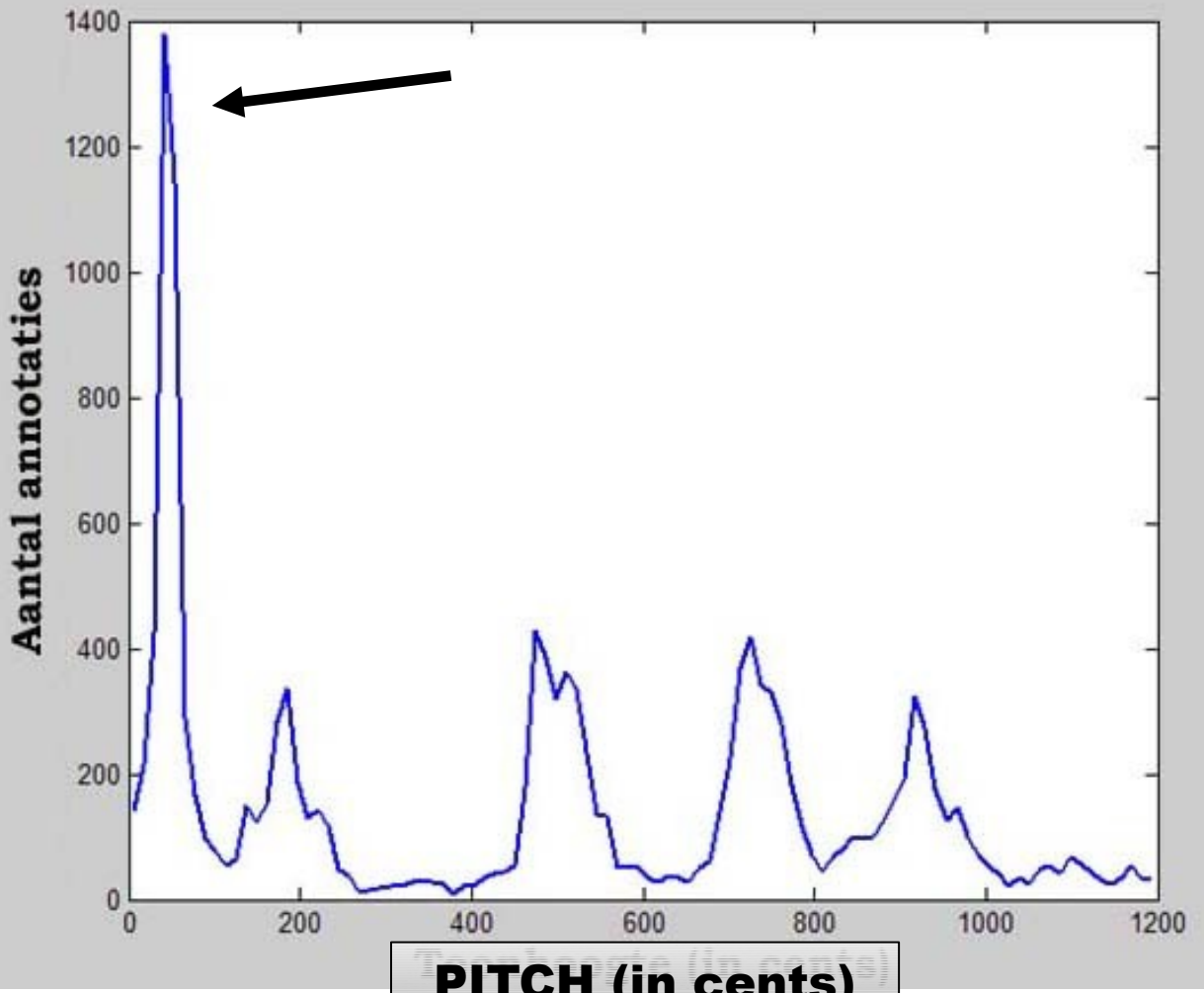




Introduction

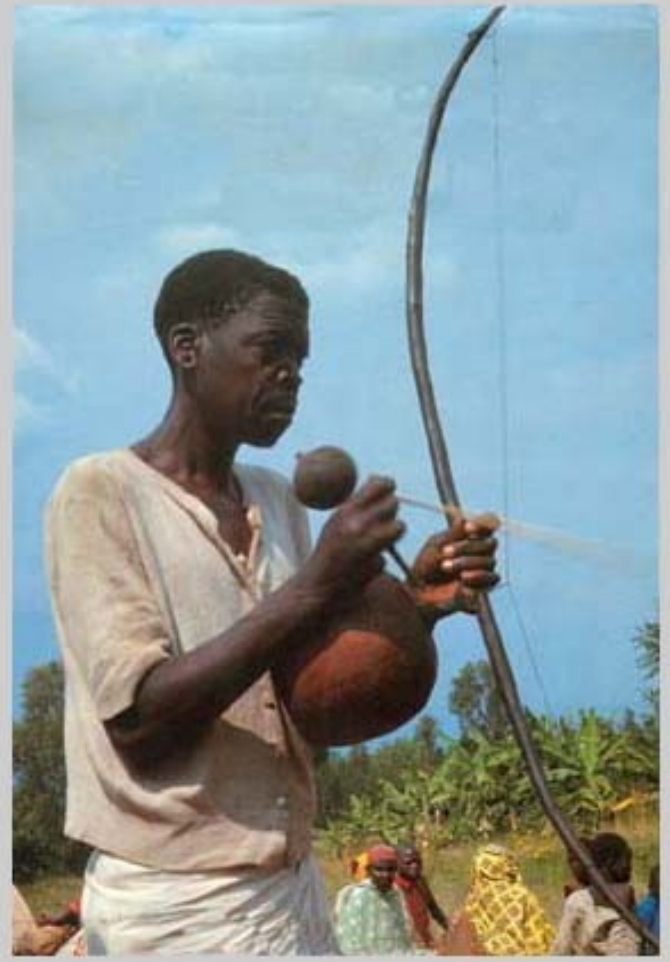
Central tone

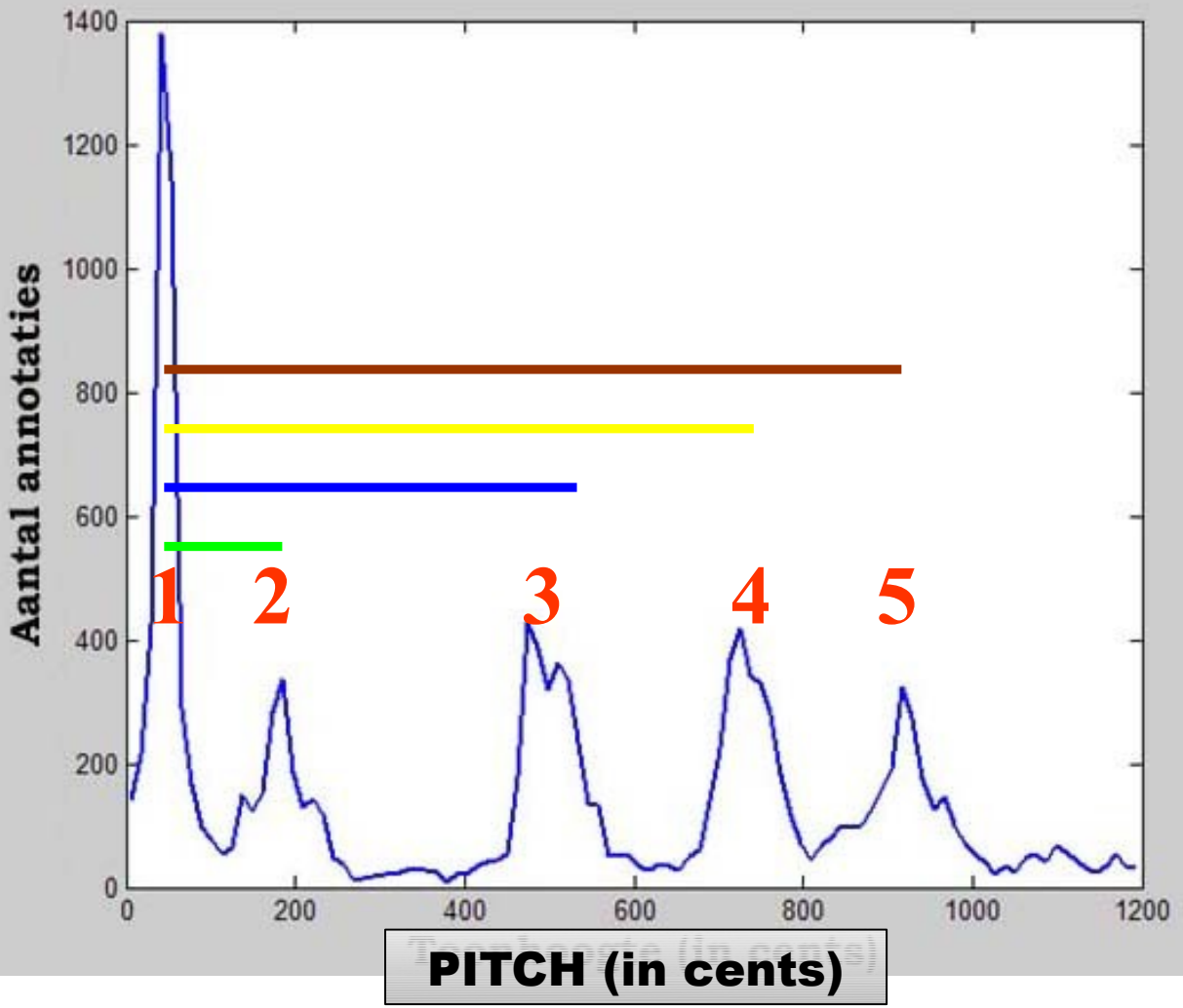




Introduction

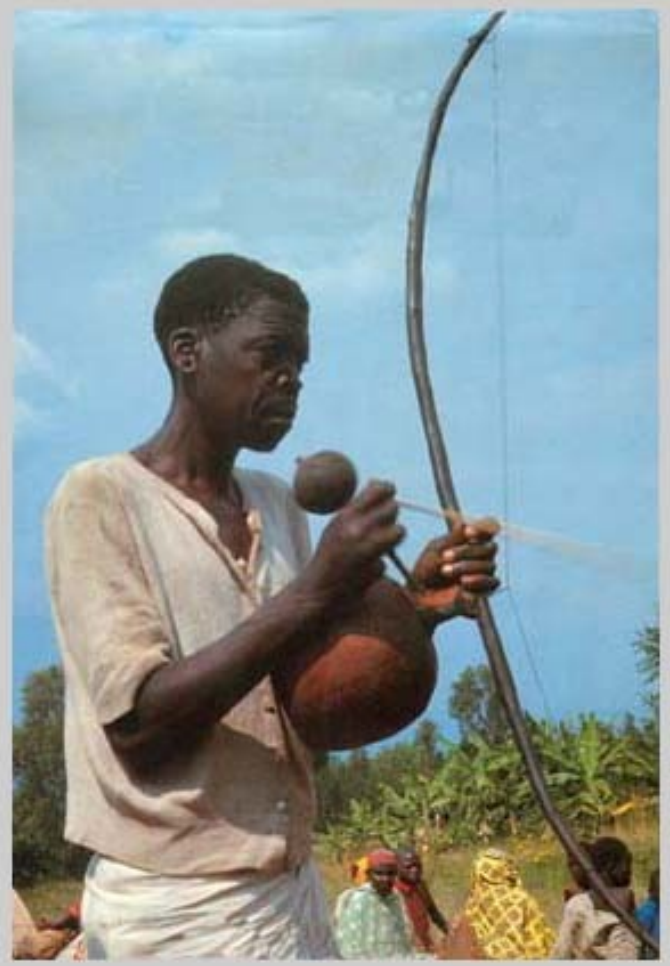
Number of used tones

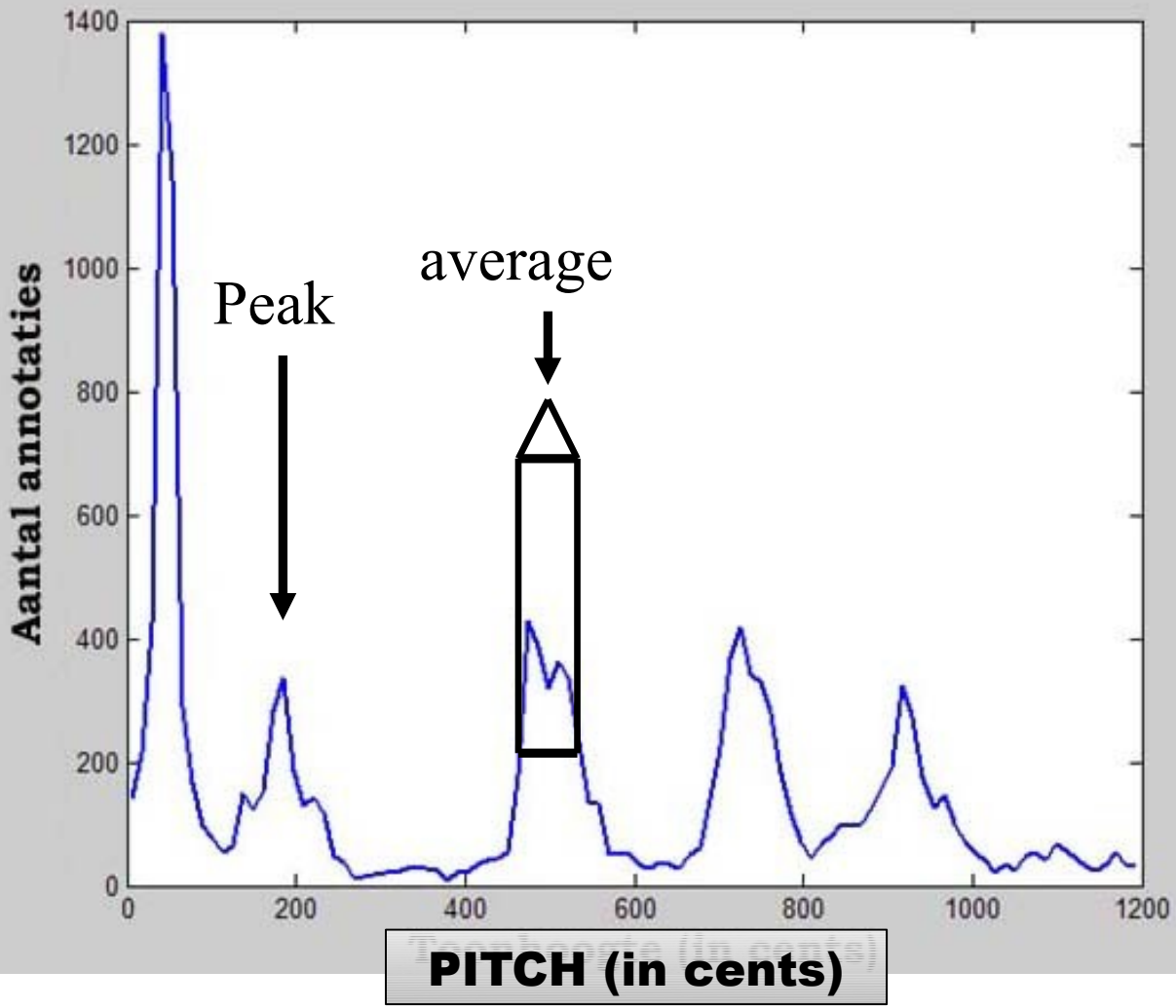




Introduction

Determination of correct pitch





Introduction

Charles Shakford:

Interval	eq.temp	hist.syst	practice
Minor sec	100	90-117	44-122
Major sec	200	182-231	187-228
Fourth	500	498-503	480-525
Fifth	700	696-702	682-723

Methodology

Design

reuse of existing software
cultural independent
automated analysis, manually adjusted
graphical
flexible
scripting
output

Methodology

Tarsos, inner workings

- **Pre-processing:**
  - Audio signal improvement:
    - Noise reduction
    - Signal optimization
  - Source separation (ONO2010)
  - Band pass filters
- **Processing:**
  - (existing) algorithms
  - Annotation optimization
- **Post-processing:**
  - Interpretation
  - Visualization
  - Export
    - Data
    - Graphical

Methodology

Tarsos, inner workings

SIGNAL LEVEL

- Test of available pitch trackers.
- Representation of output
- Real-time analysis
- Optimization results

SYMBOLIC LEVEL

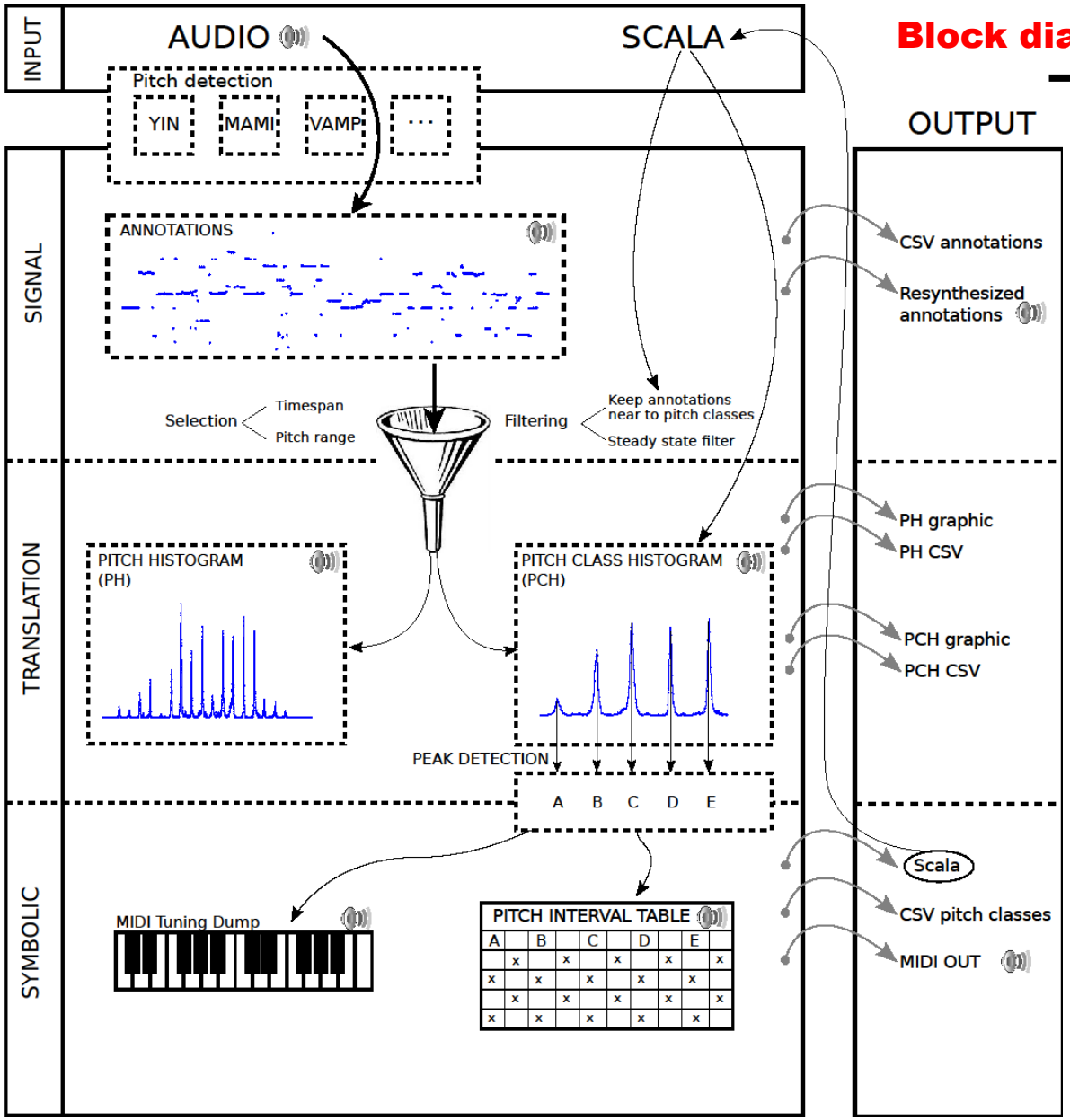
- Peak extraction (automated and manual correction)
- Peak analysis
- Correlation

OUTPUT

- Sonification
- Export

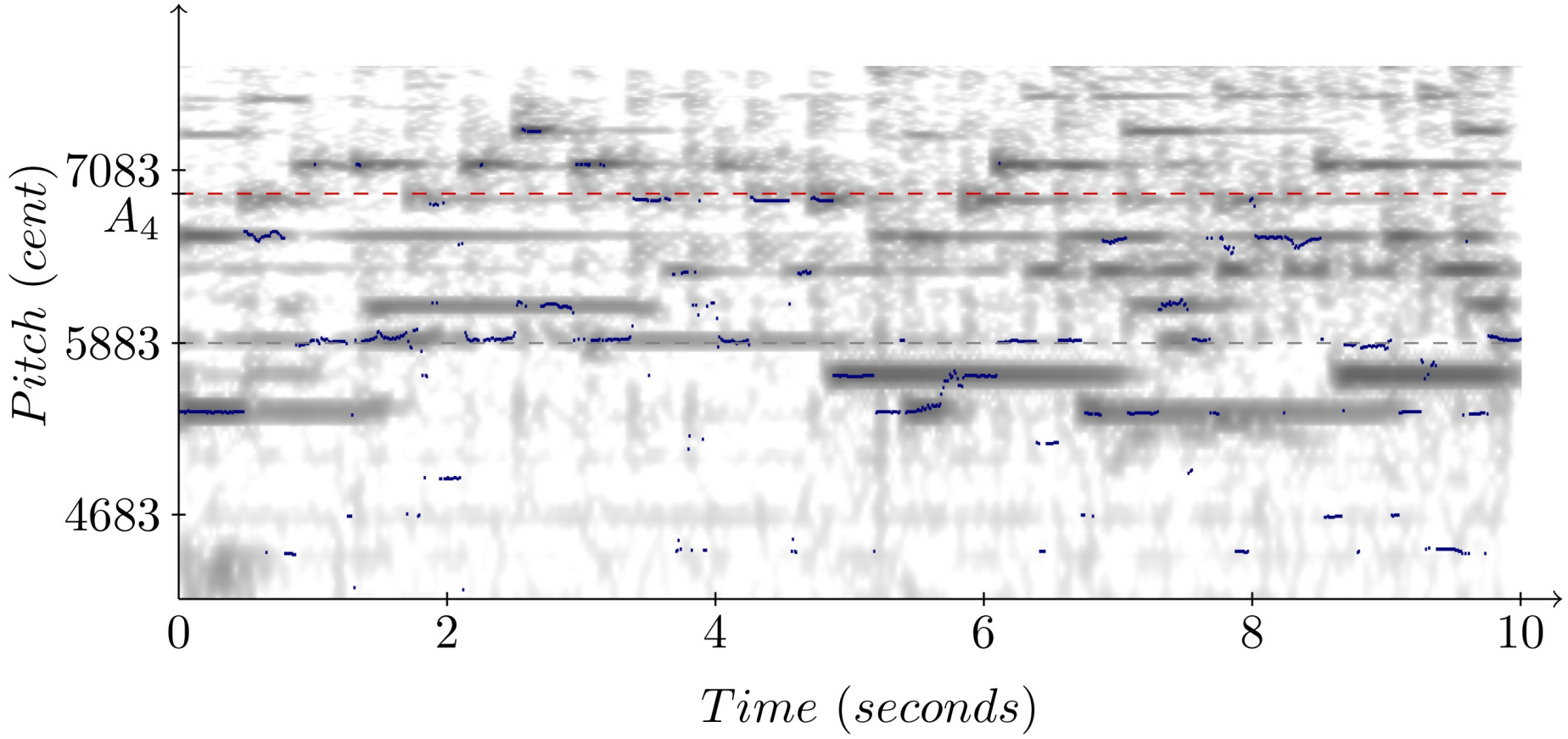
Methodology

Block diagram TARSOS



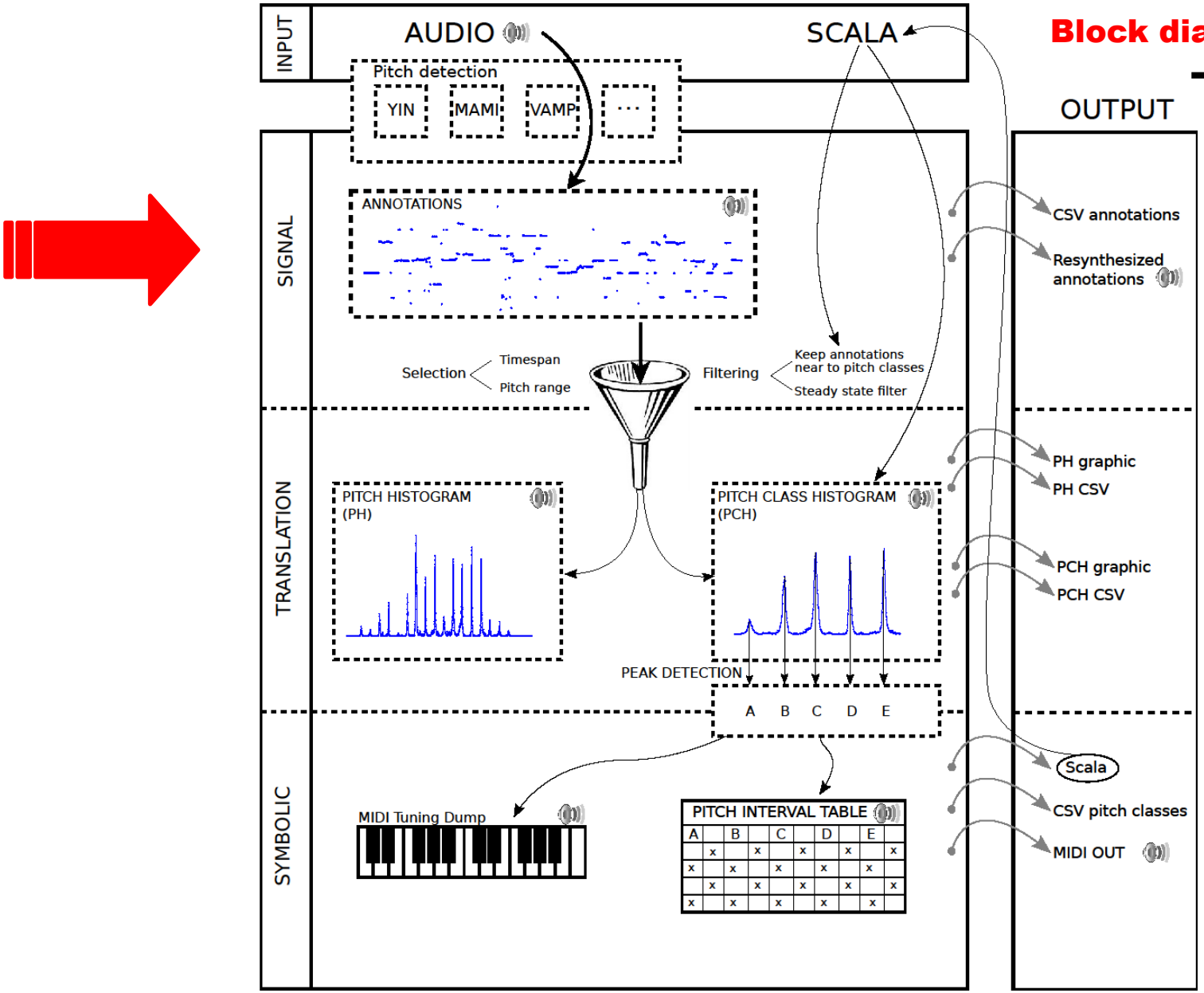
Methodology

Audio:



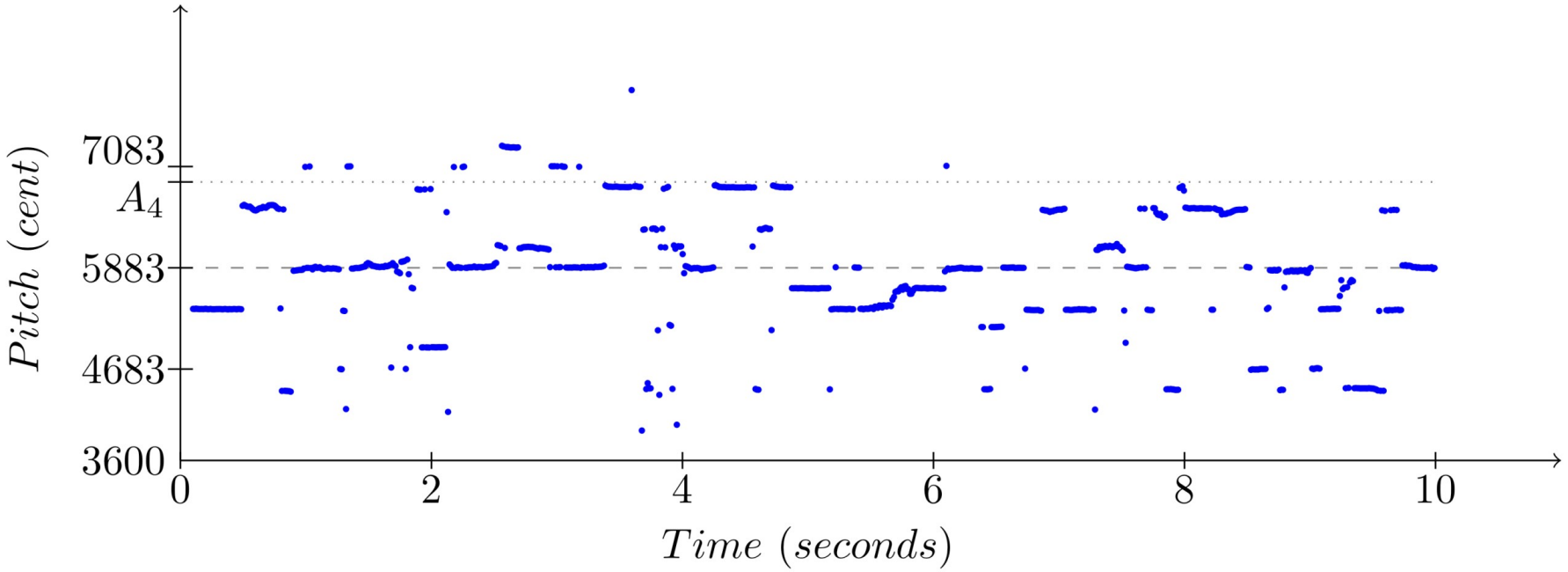
Methodology

Block diagram TARSOS



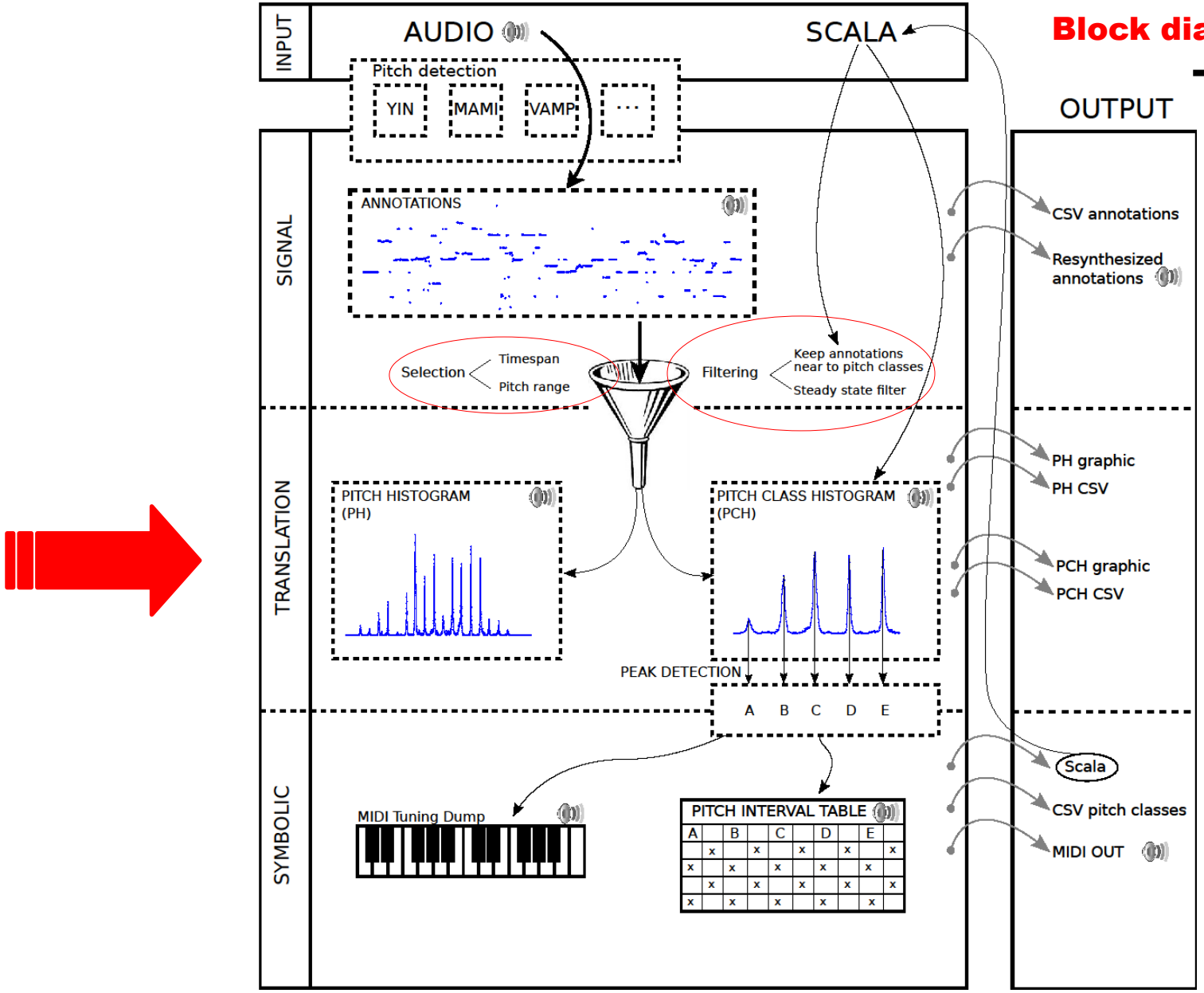
Methodology

Pitch annotations:



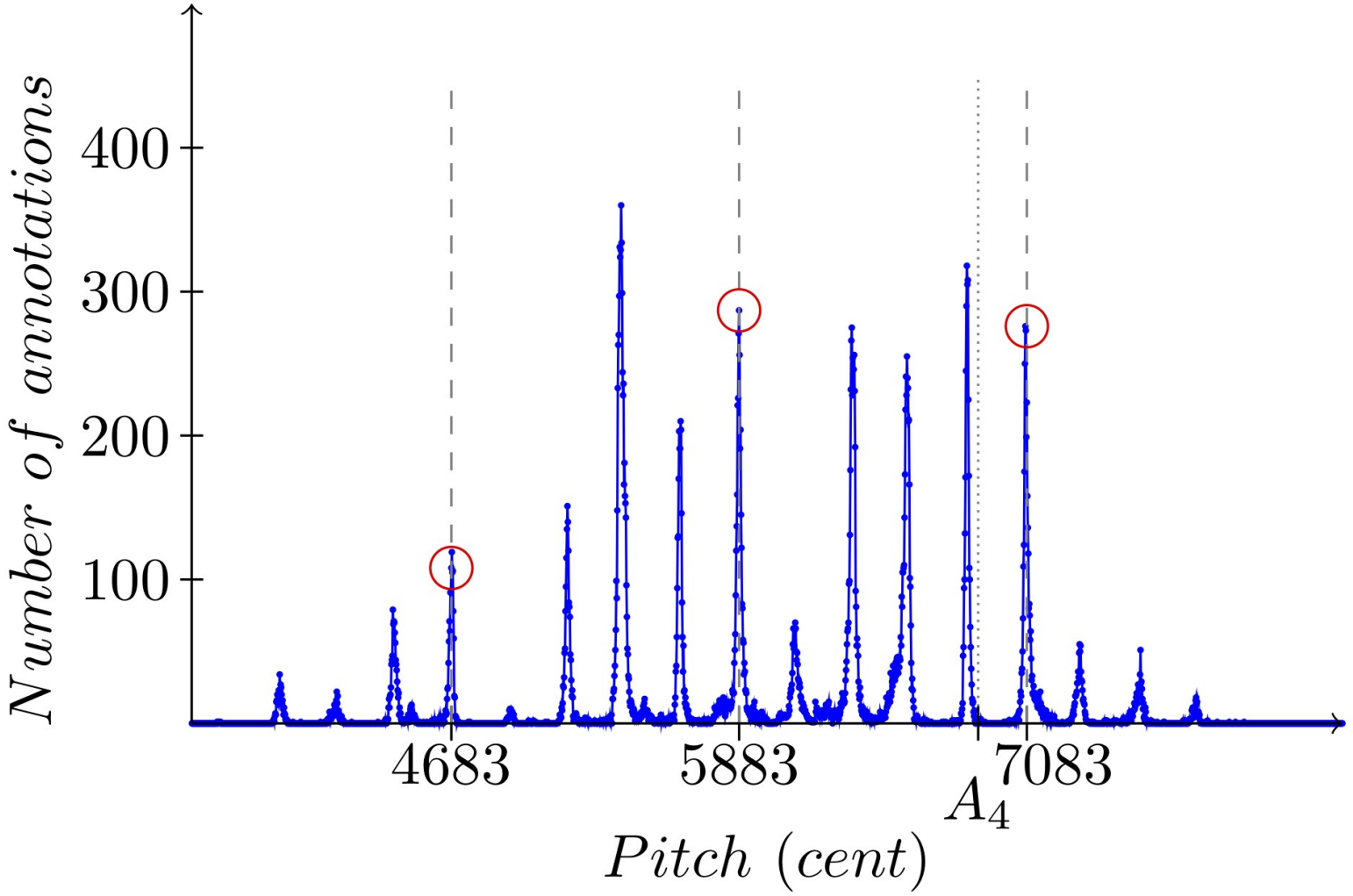
Methodology

Block diagram TARSOS



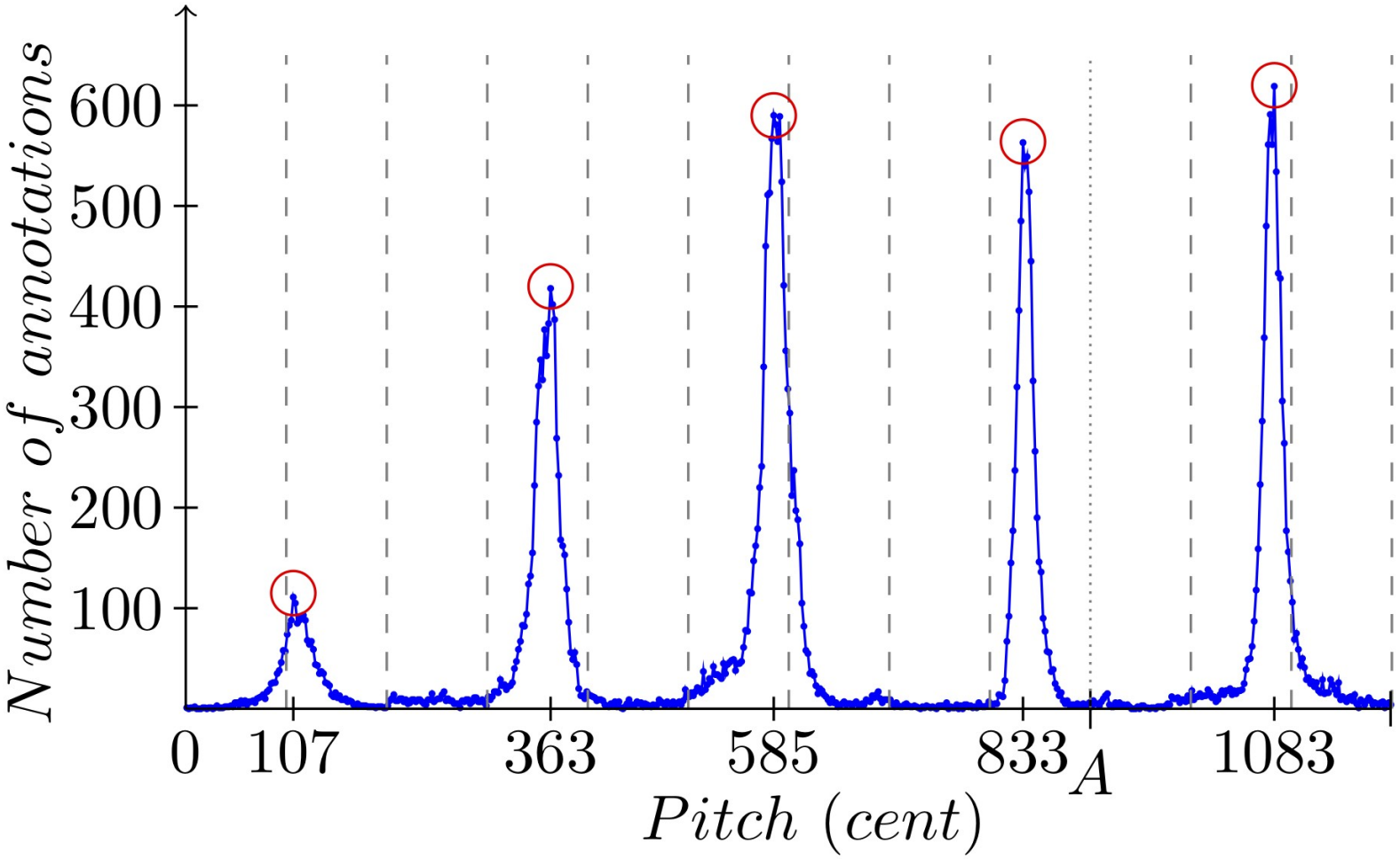
Methodology

Pitch histogram:



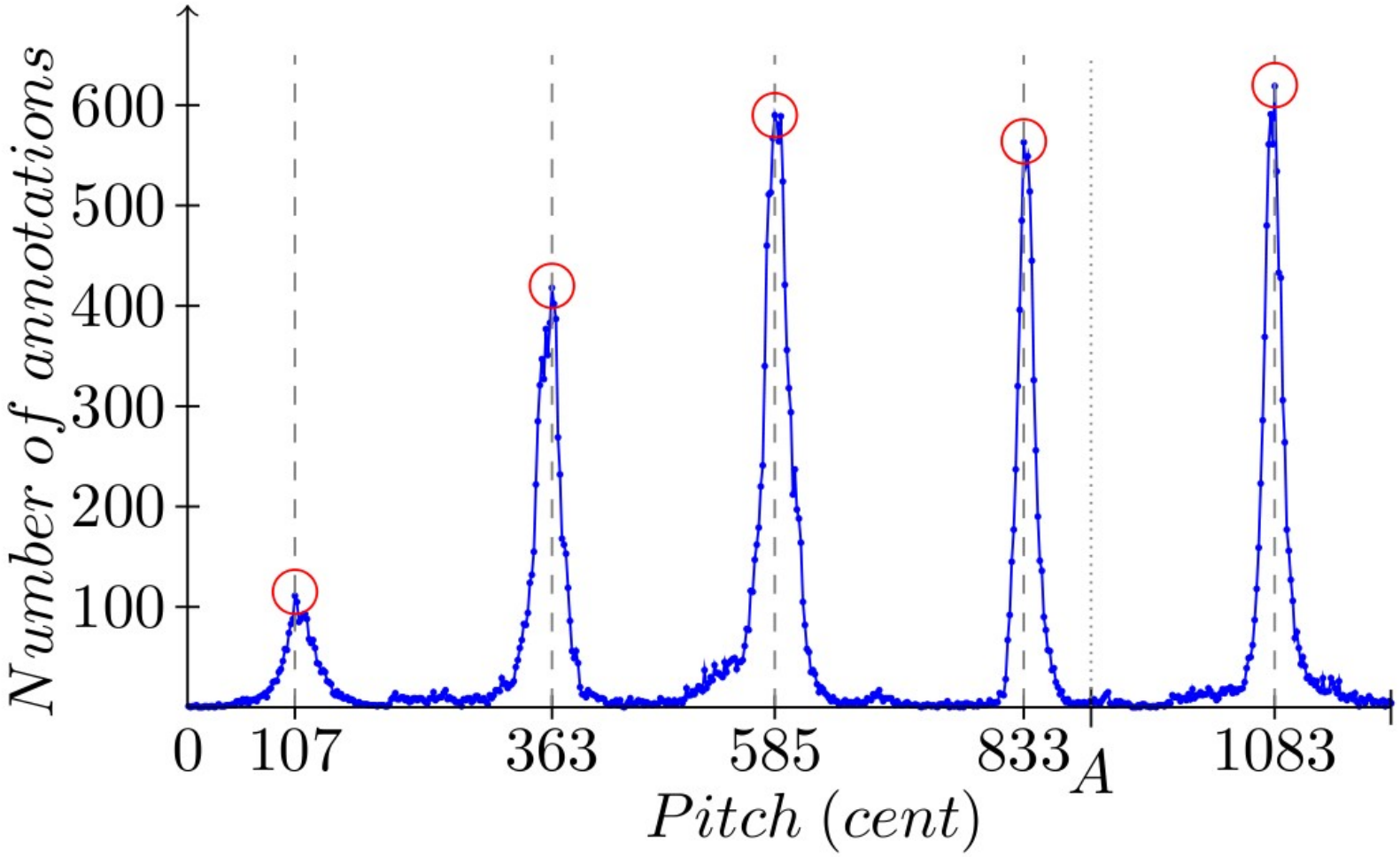
Methodology

Pitch class histogram:



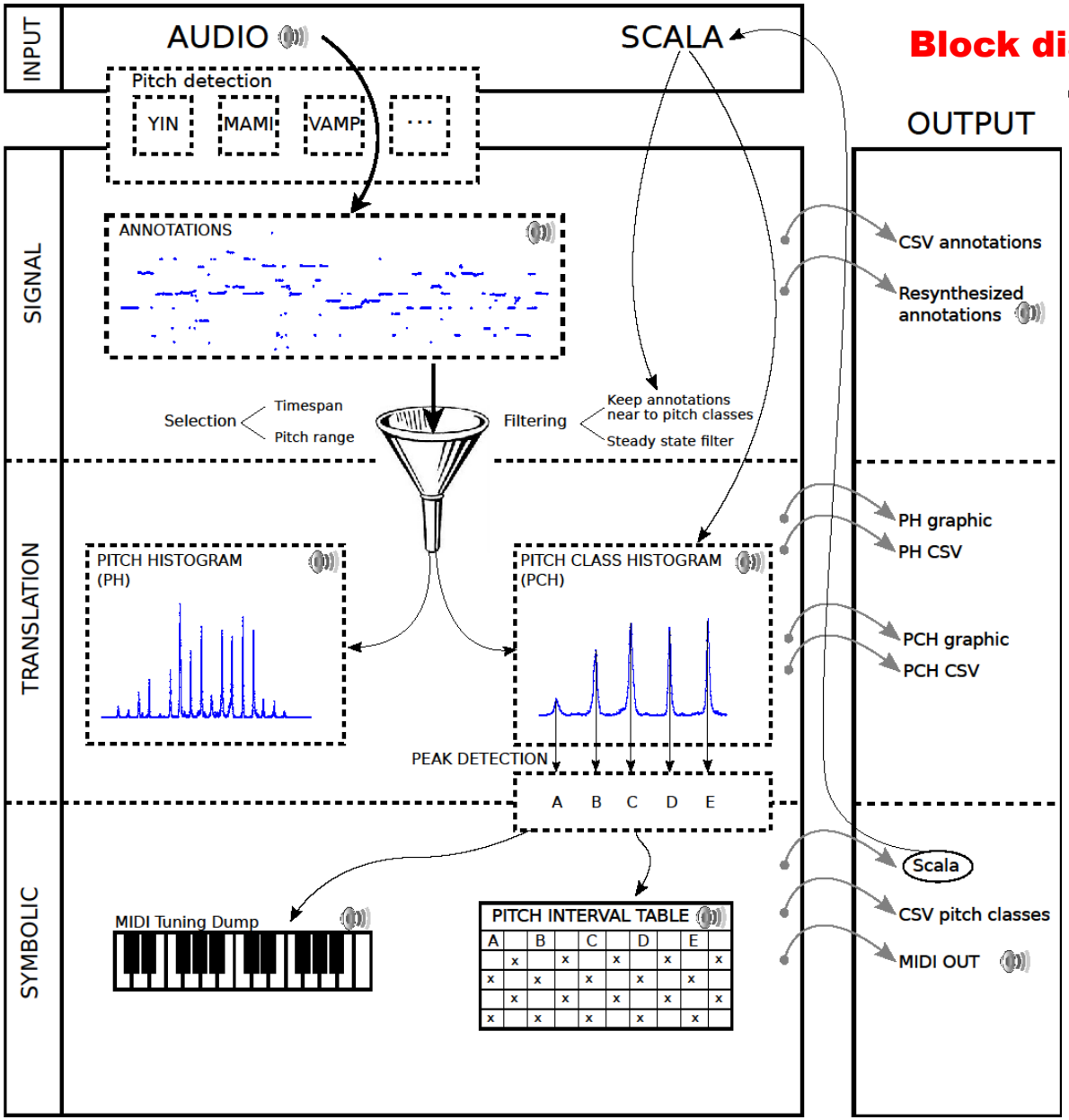
Methodology

Pitch class histogram:



Methodology

Block diagram TARSOS



Methodology

Pitch interval table:

Pitch Class (cent)	Interval (cent)
107	
	255
363	478
	222 725
585	470 976
	248 720
833	498
	251
1083	

MIDI tuning dump

Demo

API & Scripting

Scripting API for:

- Search for pitch interval
- Tone scale (makam, raga) recognition
- Audio fingerprinting
- Transcoding
- ...

Scripting possible with JVM languages:

- Scala
- Groovy
- Jython
- ...

results

Looking into:

- Pitch analysis
- Interval analysis
- Historical tendencies
- Geographical tendencies
- …

results

Scientific results: **computational ethnomusicology**

Artistic input e.g. experimentation with **microtonal compositions**

Educational opportunities: improve intonation.

context

* A correct interpretation includes its cultural framework

* Audio alone might be not sufficient

* Visual aspects, social function and context

conclusion

Future Work

- zoom annotation window
- phase vocoder
- transcription features
- temporal and timbral features

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end

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