JamSketch Deep α:
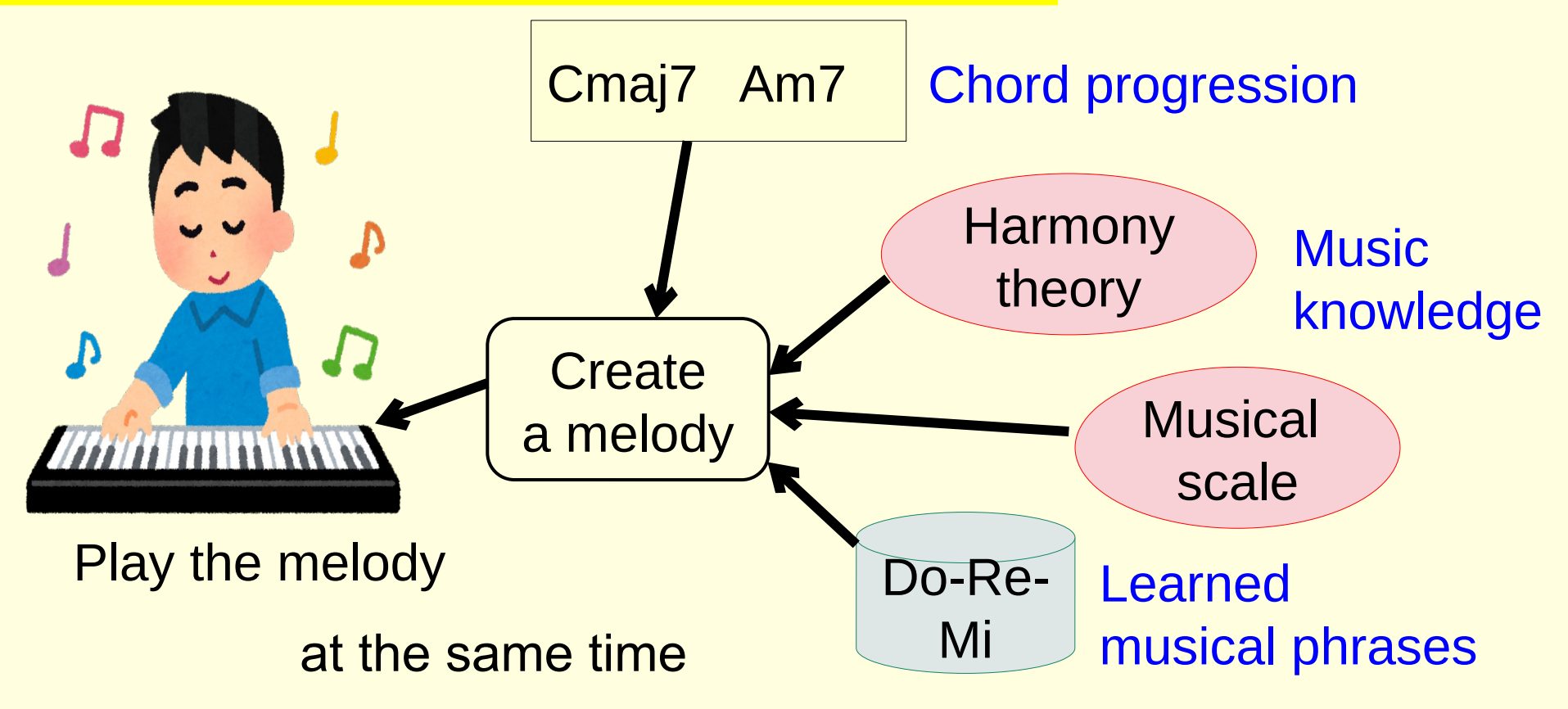## Towards Musical Improvisation based on Human-machine Collaboration

Tetsuro Kitahara and Akio Yonamine (Nihon Univ., Japan)
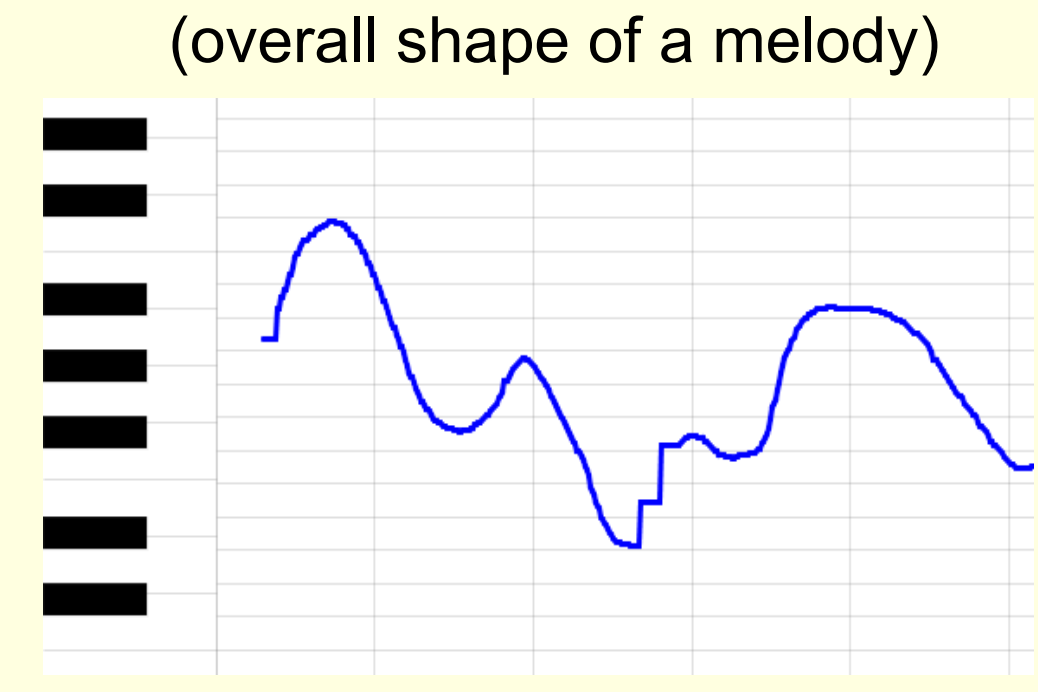
Goal

To enable <u>everyone</u> to enjoy musical improvisation

↑ including non-musicians
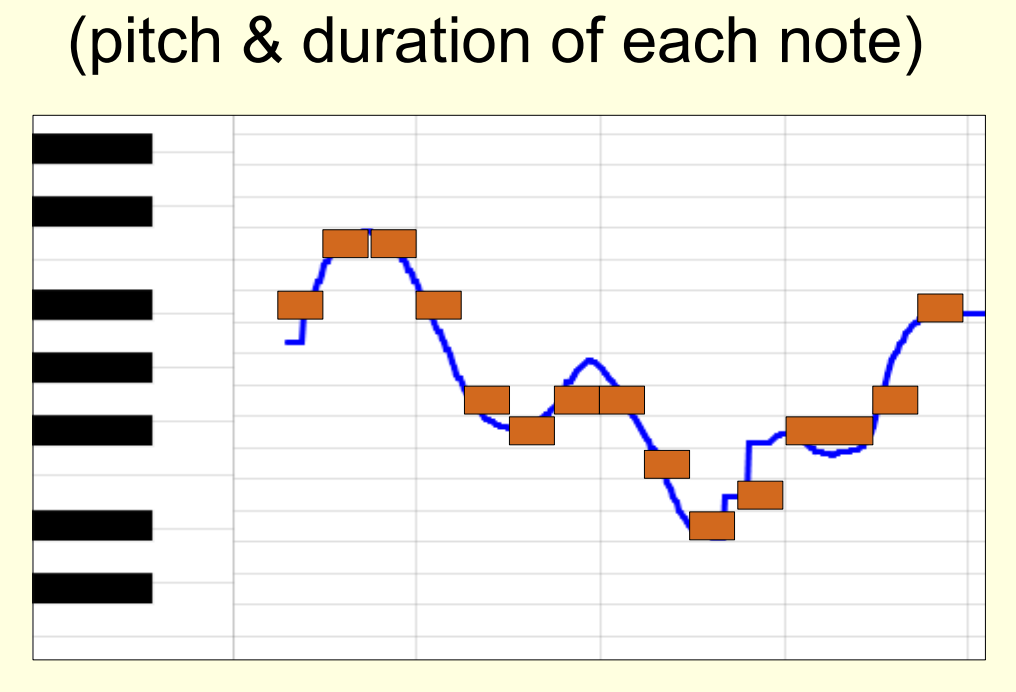
Why improvisation is difficult

Cmaj7 Am7 — Chord progression

Harmony theory → Music knowledge

Create a melody ← Musical scale

Do-Re-Mi → Learned musical phrases

Play the melody at the same time

Key idea

Macro structure (overall shape of a melody) → **by user**

Micro structure (pitch & duration of each note) → **by system**

Our system

JamSketch Deep α

System overview

Intuitive, easy to draw

User draws: **Melodic outline**

System generates: **Melody**
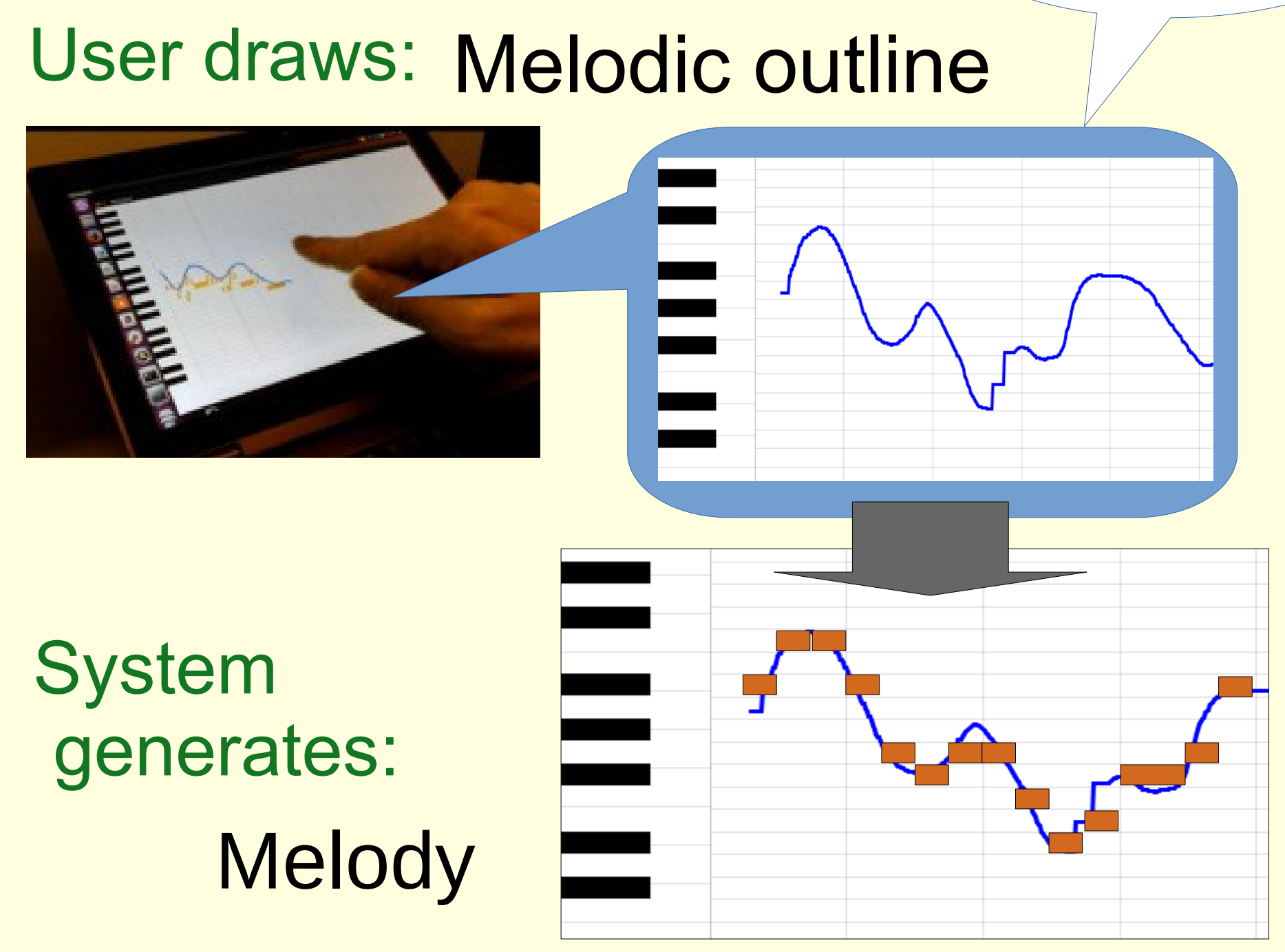
Key idea for learning & generating melodies

Weimar Jazz DB

Transcriptions of improvised melodies (Blues-style)

Pseudo melodic outline

Convert to pitch trajectory
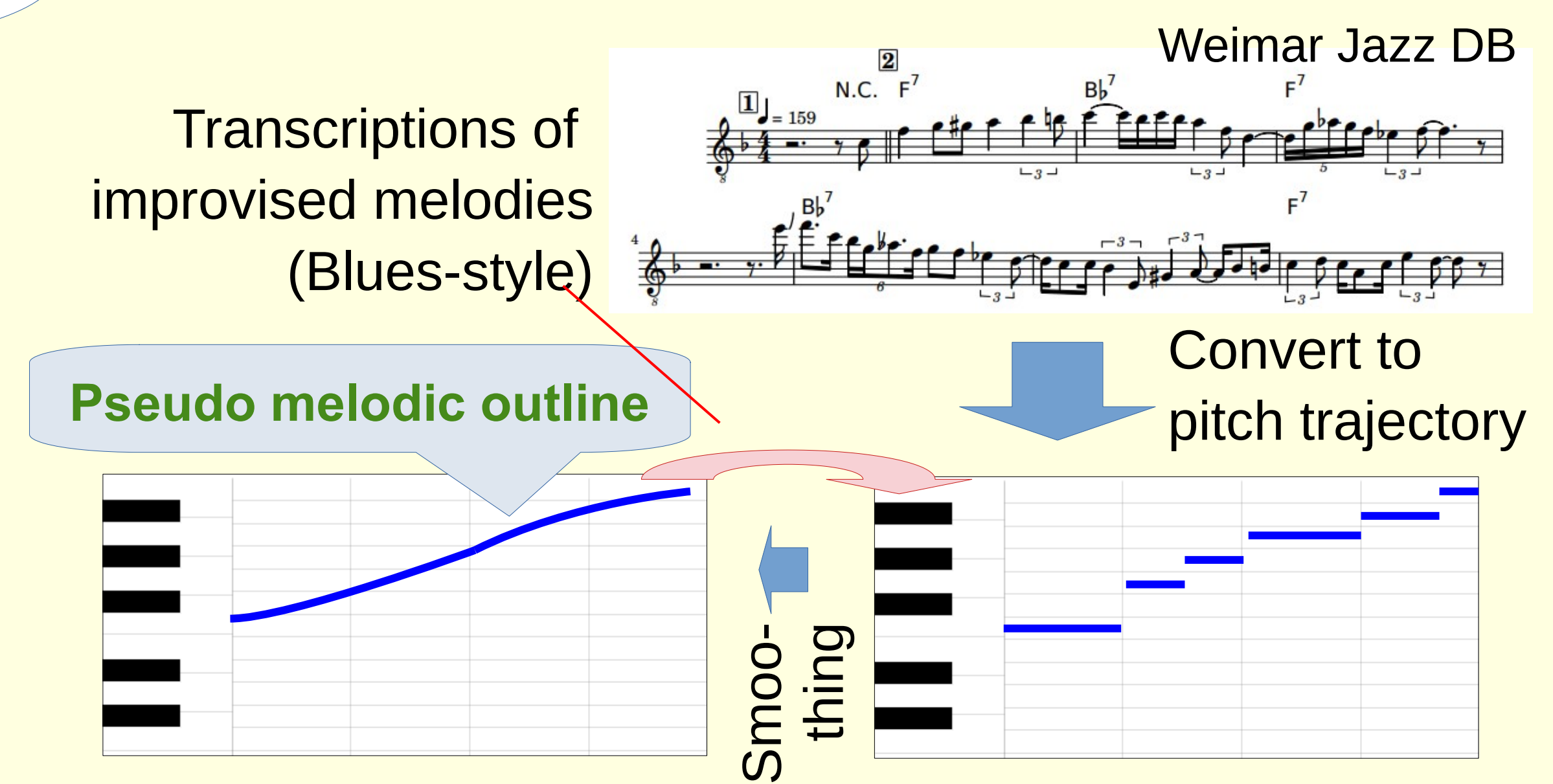
Smoothing

Estimate a **pre**-smoothing pitch trajectory from a **post**-smoothing one with a **CNN**

Data representation

Input matrix 12 frames

(C2) x1
(C#2) x2
(D2) x3

Pitch in outline (60-dim)

(B6) x60
x61
(C) x62
(C#) x63

Rest in outline (1-dim)

Chroma in chord tones (12-dim)

(B) x73

Example

Example

Output matrix 12 frames

y1 (C2)
y2 (C#2)
y3 (D2)

note starting at that time

Pitch (new) in melody (60-dim)

y6 (B6)
y61 (C2)
y62 (C#2)
y63 (D2)

note continued from the previous time

Pitch (cont.) in melody (60-dim)

y120 (B6)
y121

Rest in melody (1-dim)
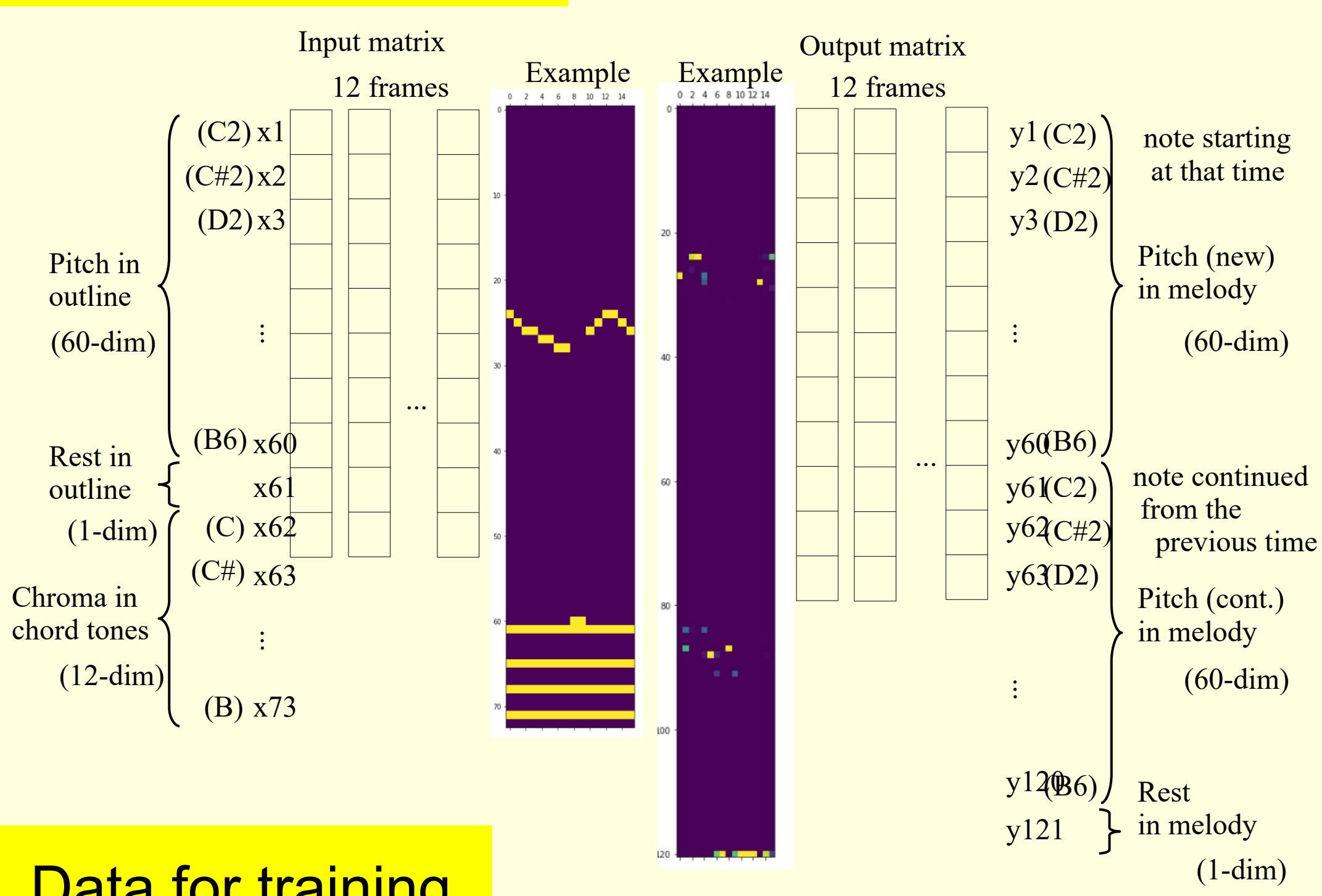
Data for training

96 Blues melodies from **Weimar Jazz Database**

Model

filter size   inv. filter size

Chord / Melodic outline

pitch → time

conv. → ch → time

conv. → ch → time

deconv → ch → time

deconv → pitch → time

Pitch (cont) / Pitch
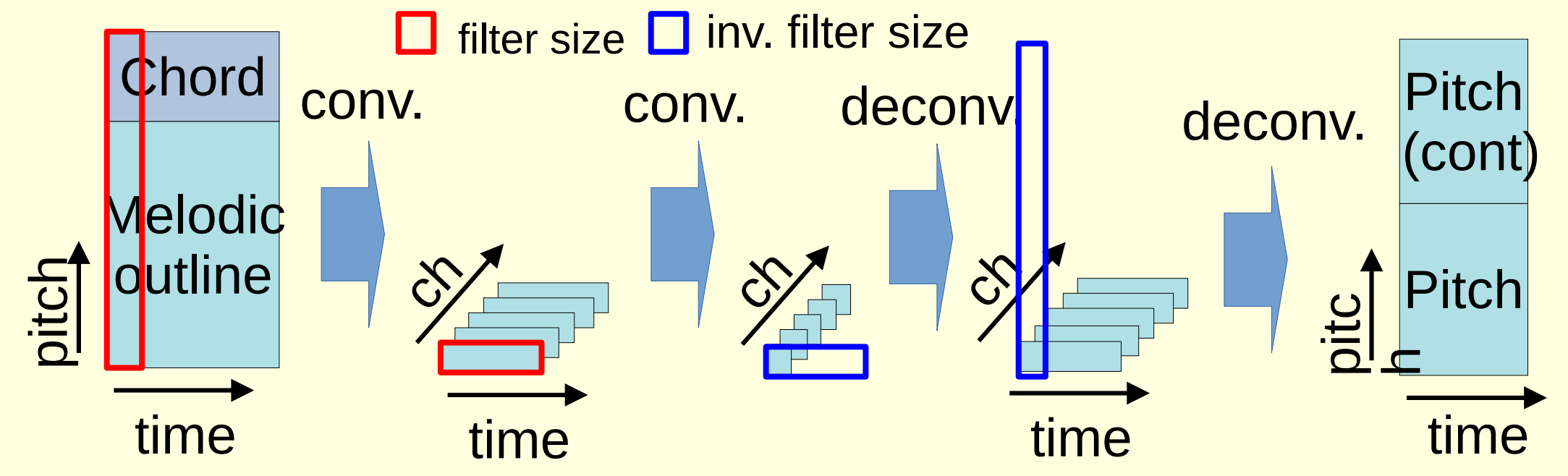
Let's download & try it!

Execution file for Windows is available at:

https://github.com/kitaharalab/JamSketch/releases/tag/releasev2

(Android version is under development)