Melodic Outline Extraction Method for Non-note-level Melody Editing

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1.Introduction

Our goal To enable everyone to edit melodies freely.

Case

When the melody output by an automatic music composition system is not satisfactory.

The editing technique

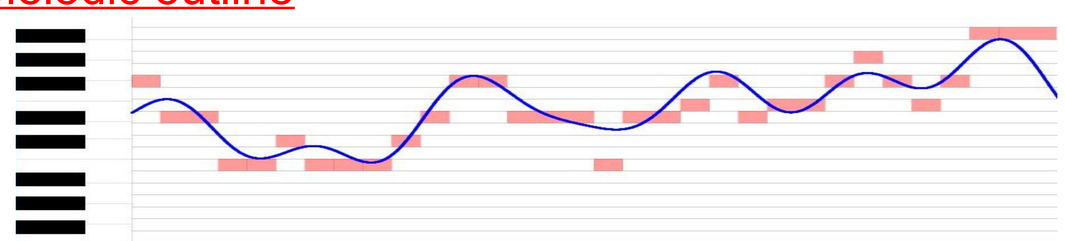
Now MIDI Sequencer (Piano-roll)

Target of editing Each note

- Not an easy operation for musically untrained people.
  - It is difficult for untrained people to avoid dissonant notes in a Midi sequencer.
    →A certain support is needed to avoid such notes a computing technology.

Our study Melodic outline

Melodic outline



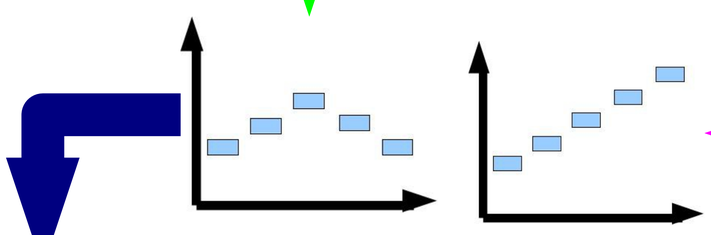
Target of editing Continuous curve representing the rough trajectory of melody line.

- An easy operation for musically untrained people.
  - A new melody representation in which note-level information is hidden.
  - The user can redraw the melodic outline repeatedly until a satisfactory melody is obtained.

2.Flow Chart

Existing automatic music composer

Compose

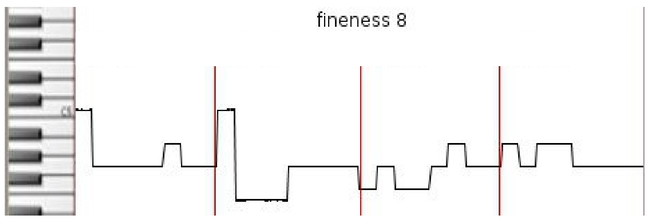


Regenerate melody

I want to make notes a little higher

Redraw by user

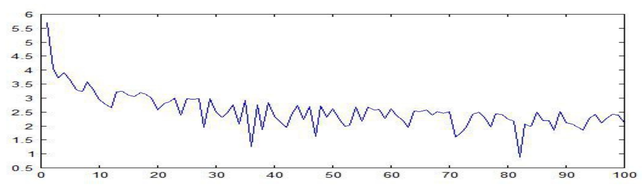
Generate melodic outline



Key point

- **Regarding the pitch trajectory as a periodic signal, the Fourier transform is applied to this trajectory.**

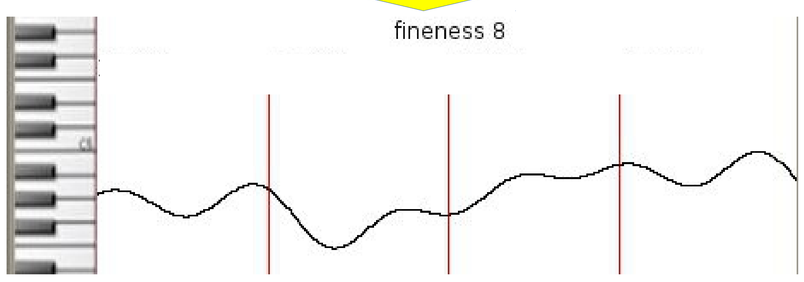
FFT



Low-order　High-order

Low-order

IFFT



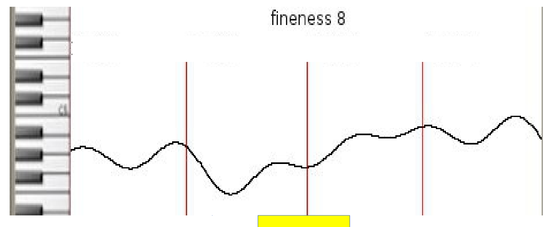
*Use later

Melodic outline

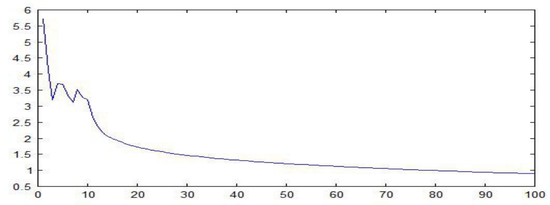
Key point

- **By extracting low-order Fourier coefficients and applying the inverse Fourier transform to them, a rough pitch contour of the melody is obtained.**

Regenerate melody from melodic outline



FFT



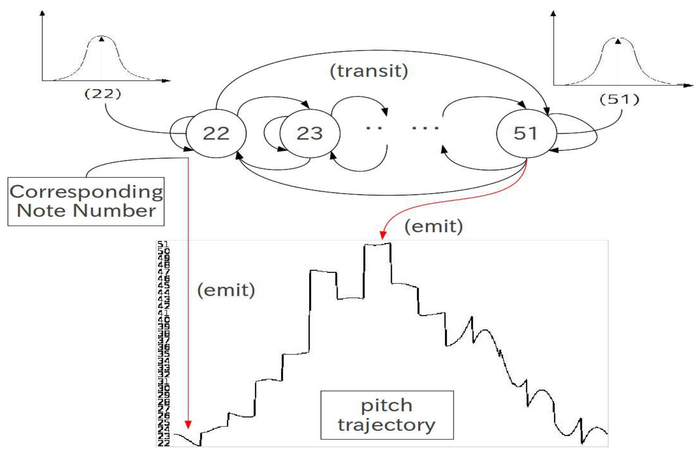
Low-order　High-order

IFFT

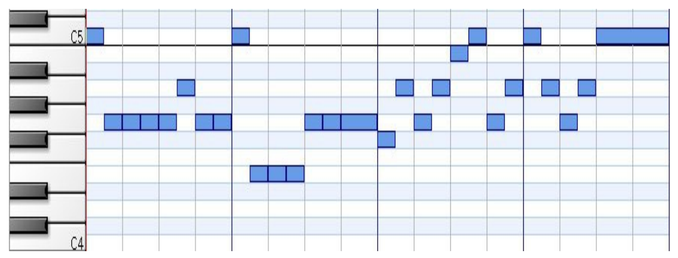
Key point

- By applying the biterbi algorithm to this HMM, we estimate optimal note sequence given a distorted pitch trajectory.

Overview of the HMM



HMM



Key point

Hidden states:A musically appropriate note sequence.

Emission:A value of pitch following a normal distribution.

The transition probabilities :experimentally determined.

3.User test

Procedure

1.As a target of editing, we used a four-measure melody generated by Orpheus(Fukayama 2010).*

2.Input Japanese lyrics is (Osake wo nondemo ii / Sorega tanosii kotodakara)**

3.Subjects edited the melody freely.

Questionnaire:

Q1 Were you satisfied with the output?

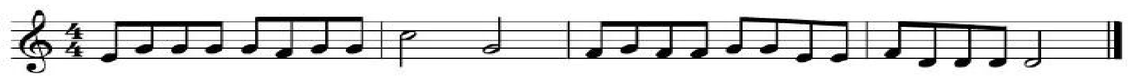
Q2 Did you edit the melody without difficulty?

Q3 Were you able to edit the melody as desired?

	A	B	C	D	E	F	average
Q1	6	6	6	5	6	5	5.6
Q2	6	7	7	3	6	6	5.8
Q3	6	3	6	3	7	6	5.1

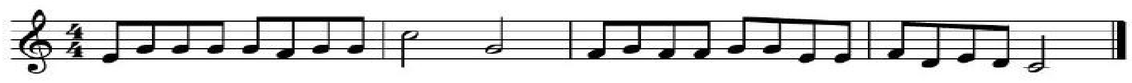
Questionnaire results.

Input melody

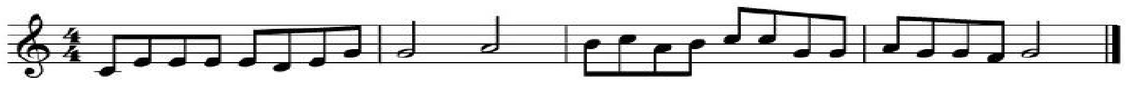


Subject A

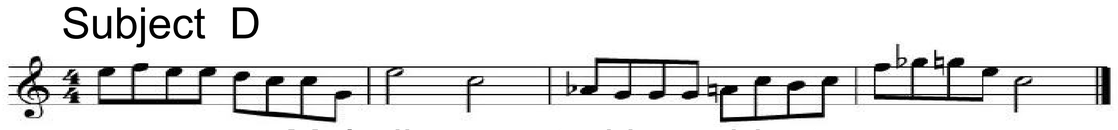
Subject B



Subject C



Subject D



Melodies created by subjects.

* Generates the melody that best matches the prosody of the lyrics given by user.

** The literally means "You may drink alcohol, if it makes you happy".