

Gospel's friend (ver 0.5)

**Lyric-based composing software
development**

Beomsoo Kim

**ISE575 / EE675
USC, Spring 2007**

Contents

- **Introduction (purpose)**
- **Features**
- **How to operate?**
- **Results**
- **Conclusion**
- **Future plans**

Introduction

- Many algorithm covers jazz/classical music, but not for a simple (but strict) song.
- Gospel Song (or some kids' song)
 - Rhythmic feature,
 - Tonal (or chord) feature
 - Emotional feature
 - Melody first? Or, Lyric first?
 - For gospel song, lyric is important

Introduction (cont'd)

- **Emotional analysis**
 - Instrumental song's melody includes emotional data
 - Lyrics contains emotional data -> effect on melody line
 - **Tensional variance in whole story**
 - **rhythmic variations in a sentence-basis**
 - **Use them as a composing method**

Features

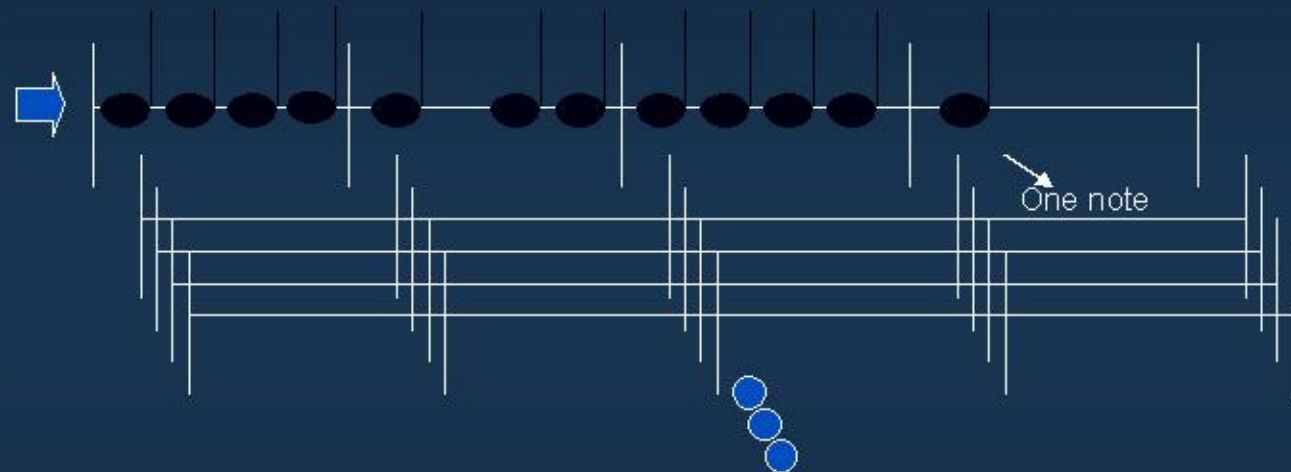
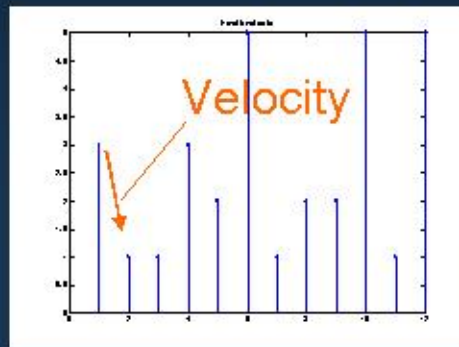
- You don't need to understand music theory to compose a song with chord data, wav file outputs.
- You only have lyric data & emotional data
 - How many syllables does a word has?
 - How important a word is?
- Of course, you need to put basic values
 - What key? Which scale? Compass region? Tempo?
(Ex: Cm, pentatonic, C3-D#4, slow)
- Good for short gospel songs, like responsorial song or Hymn.

How to operate?

- Lyric based input with emotional importance matrix.
- Basically random notes generation for first 4 measures
- Then find chords and rhythms matched with them.
- From the statistical data of lyrics, structural data and related other notes are created
- Giving chord and rhythm in the text score (possibly transferred to MIDI soon : notation compatible)

How to operate : Emotional Data

Ex : This little light of mine, I'm gonna let it shine. : 12 syllables



- Durations of note : mimic the pattern of emotional data
- Start Note : starts with the note corresponding to $\text{std}(\text{acceleration})$
- Sequence of notes : Random walk + $\text{mean}(\text{acceleration}) + \text{velocity}$

weighting : $\text{RW} (-4 \sim 4) + \text{M}(\text{acc}) (-2 \sim 2) + \text{Velocity}$

How to operate : Emotional Data

- Emotional importance (subjective values 1-10) for each words -> processed with 4 measures chunk
 - Higher values : higher durations per 2 beats
 - Try to find the closest rhythm patterns from data
 - Mean/Std values : Rhythmic variations, pitch weighting matrix generated
 - Derivative of emotional data : velocity & acceleration
 - Std(velocity) : # of rests in 4 measures
 - Std(accleration) : 1st note decision
 - Mean(acceleration) : emotional acceleration effects on the direction of the next note.

Result

- **Examples**

- **Matlab program**

- **Some samples**

- **Lyric : Come, now is the time to worship. Come, now is the time to give your heart. Come, just as you are to worship. Come, just as you are before your God.**



4/4 slow

Major



3/4 mid.

Major



6/8 mid.

N. Minor



2/4 fast

H. Minor

ISE575 / EE675

USC, Spring 2007

Beom soo Kim

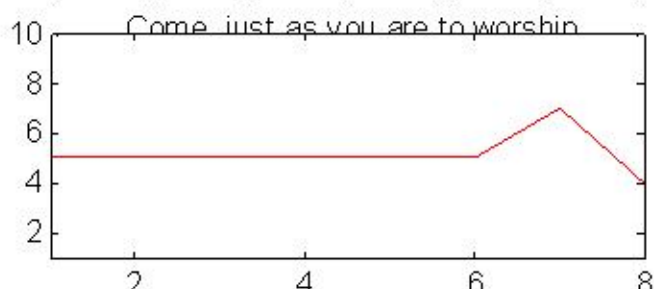
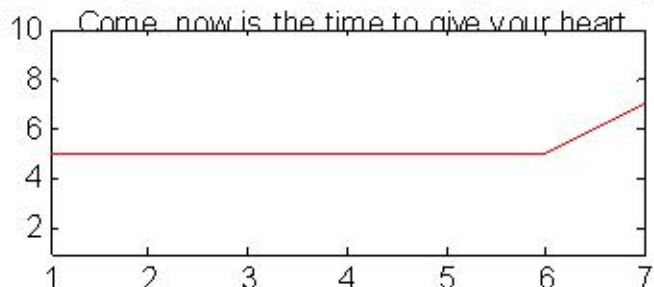
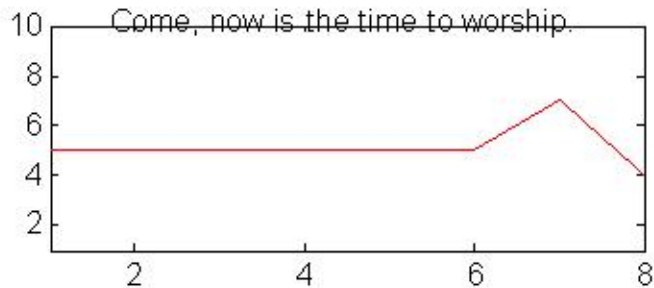
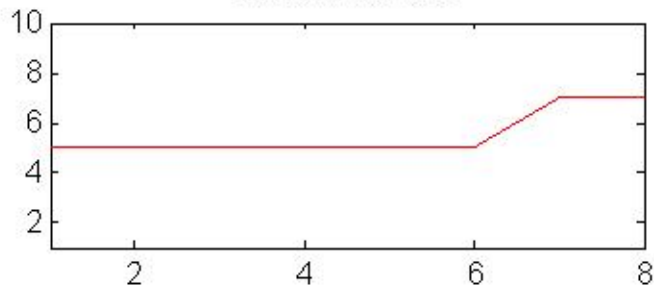
- >> lyric_input
- please input lyrics you want to compose :Come, now is the time to worship. Come, now is the time to give your heart. Come, just as you are to worship. Come, just as you are before your God.
- word1 =
- Come,
- Please type # of syllables of the upper word : 1
- Please type 1-10 values of importance emotially for your song : 3
- word2 =
- now
- Please type # of syllables of the upper word : 1
- Please type 1-10 values of importance emotially for your song : 2
- word3 =
- is
- Please type # of syllables of the upper word : 1
- Please type 1-10 values of importance emotially for your song : 1
- ...

- >> compose
- What key (ex: C, F#m, Bb)? : C
- num_of_sharp =
- 0
- Please choose scale (pentatonic=1, major=2) : 2
- What is the compass of the melody (ex: C3-E4)? : C3-C4
- Please type the time signature for your song (type : 2/4, 3/4, 4/4, 6/8) : 4/4
- Please type how fast your song will be (1=slowest, ..., 9=fastest) : 5
- bakja =
- 8 8 2 4 2 8 8 8 12 4
- Are U Satisfied? (listen again=1, no (w/tempo)=2, no (w/o tempo)=3, yes=4) : 4
- Composed theme will be saved for 4 measures...
- ans =
- 1 4 2 1
- Are you satisfied? (1= No, 2=Yes (keep this) & compose more, 3=Yes (keep this) & quit : 3
- ans =
- 1 data were saved into compose_theme.mat file.
- bakja =
- 4 4 8 4 4 8 4 4 8 12 4
- bakja =
- 8 8 2 4 2 8 8 8 12 4
- bakja =
- 4 4 8 4 4 8 4 4 8 12 4
- ans =
- lyric and chord data were saved into score.txt file.

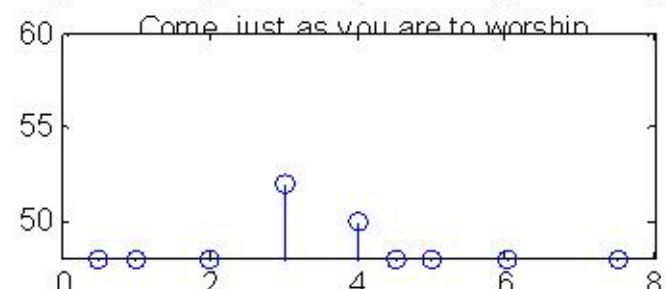
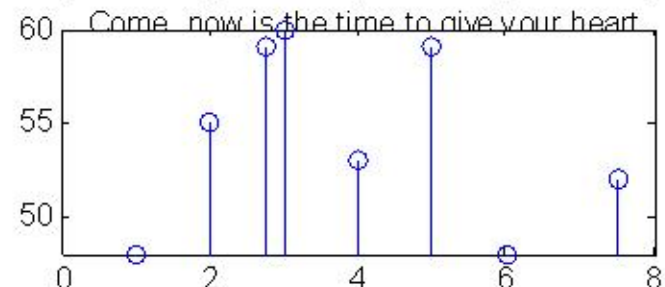
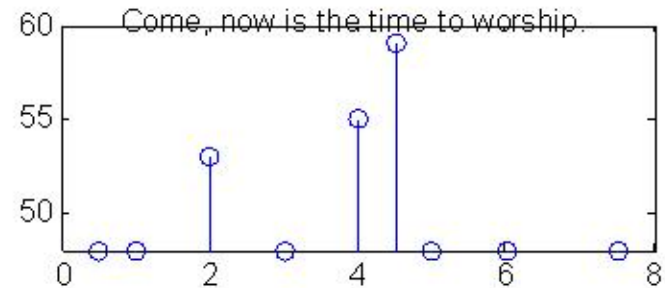
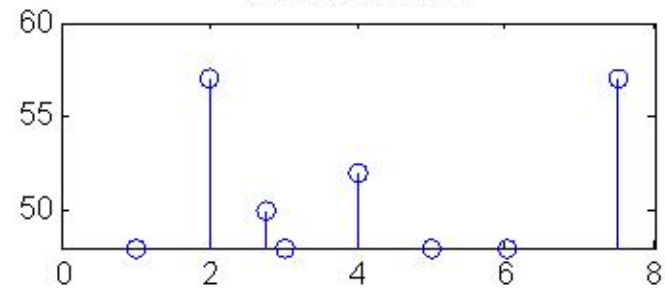
Monotonic emotions



Emotional Data



Note Generated

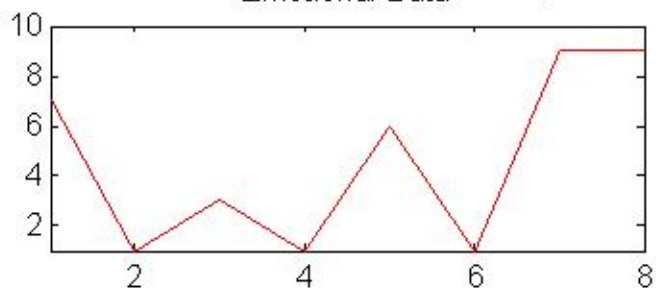


. Come, just as you are before your God.

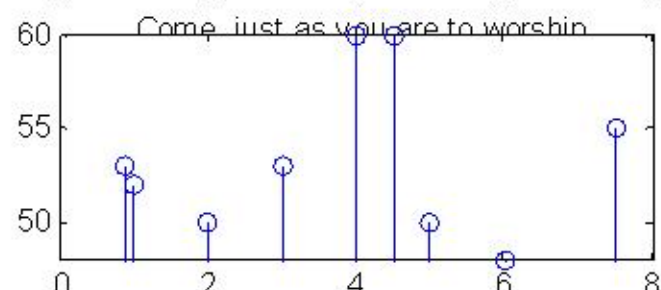
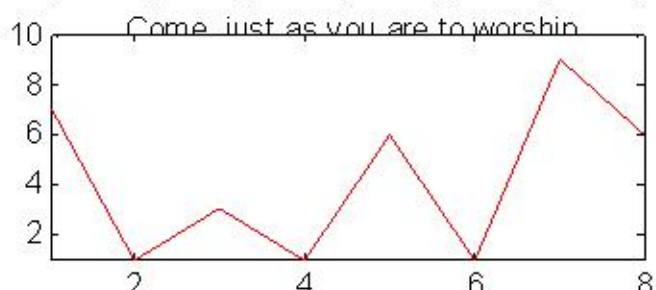
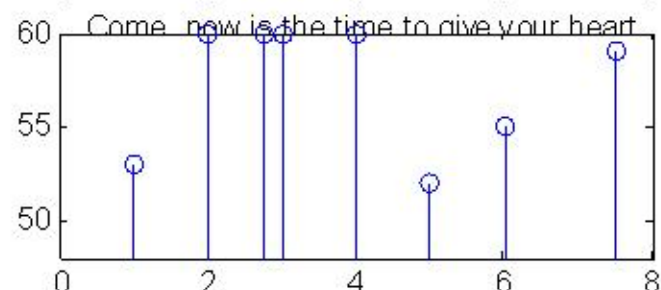
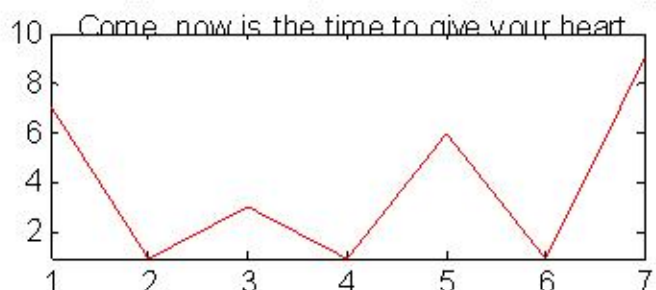
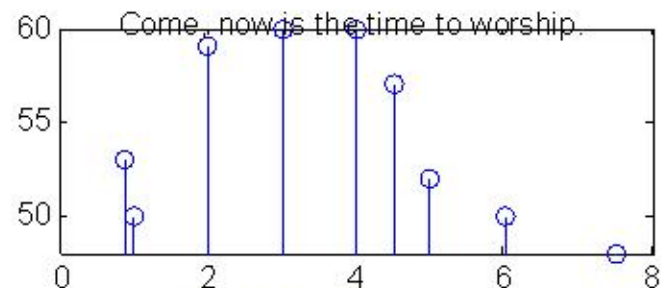
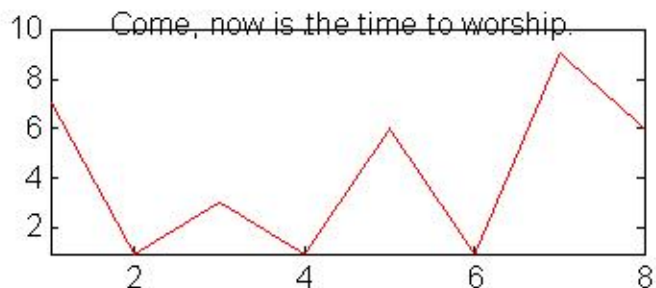
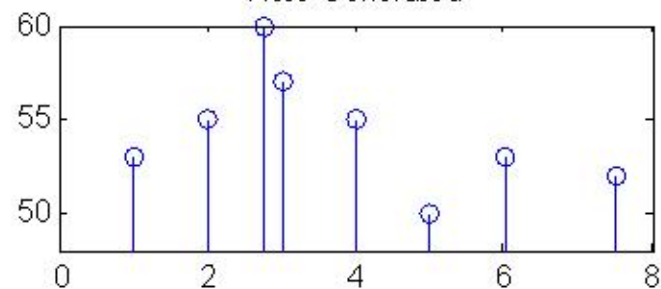
. Come, just as you are before your God.

Up & Down emotions

Emotional Data



Note Generated

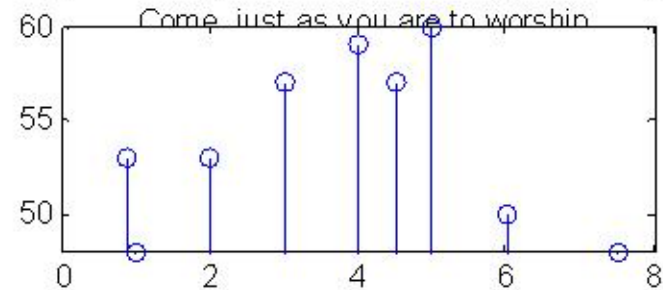
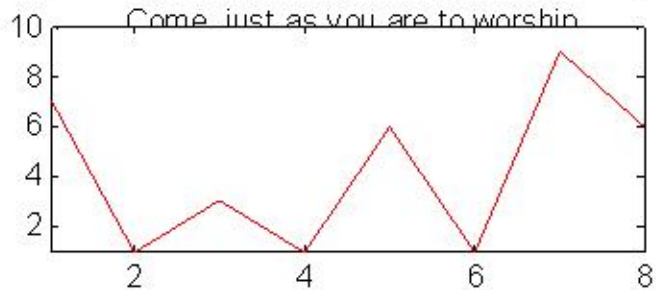
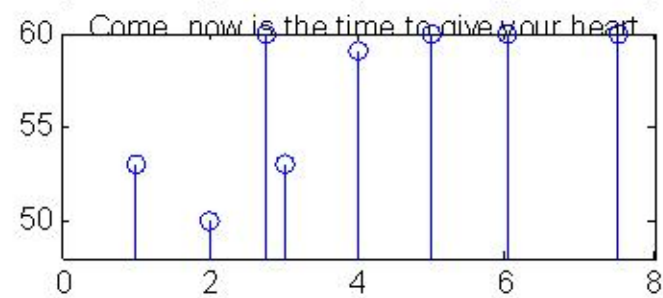
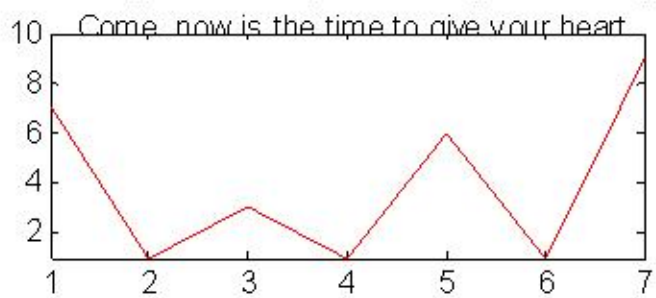
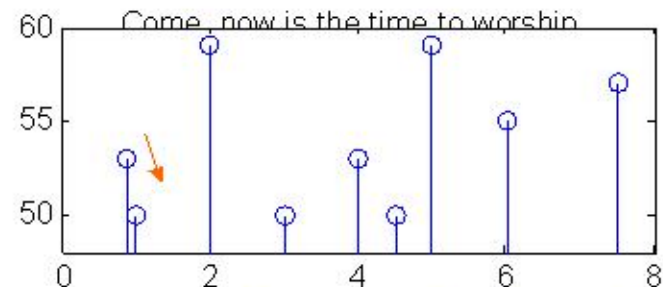
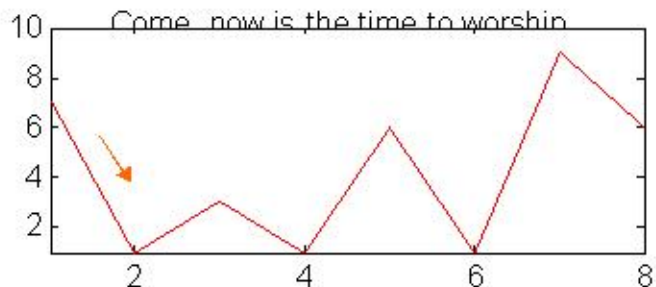
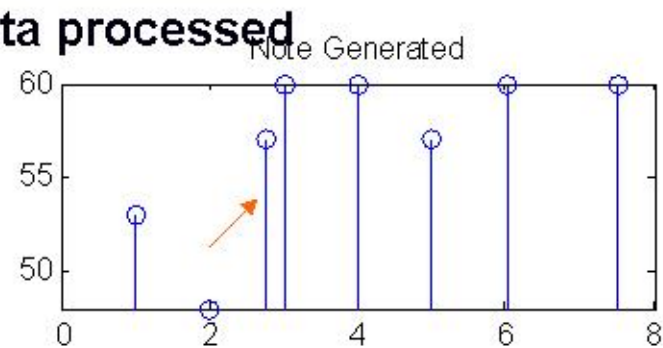
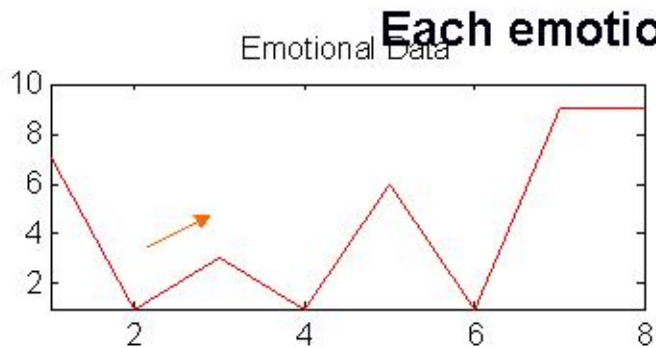


. Come, just as you are before your God.

. Come, just as you are before your God.



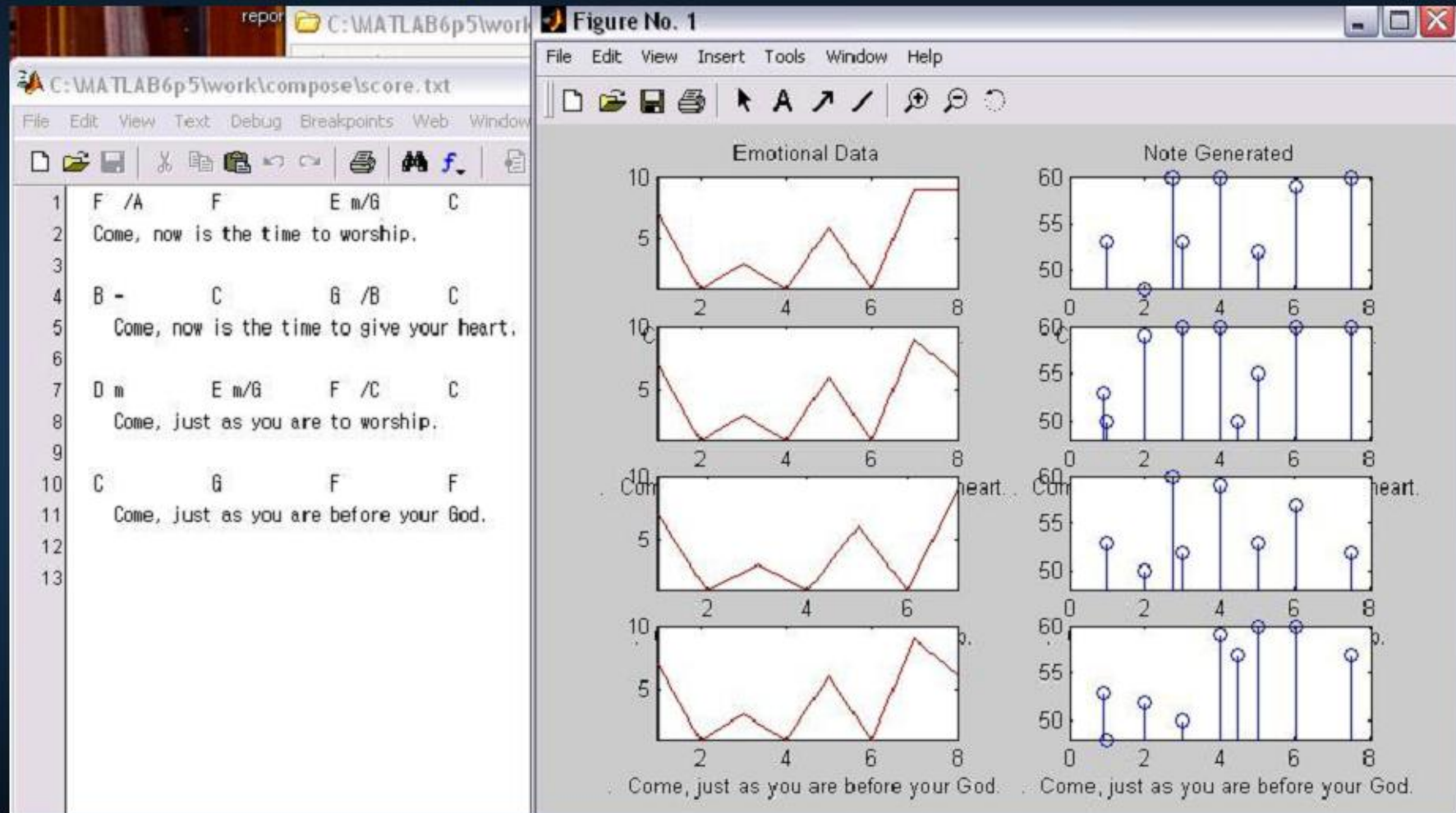
Each emotional data processed



. Come, just as you are before your God.

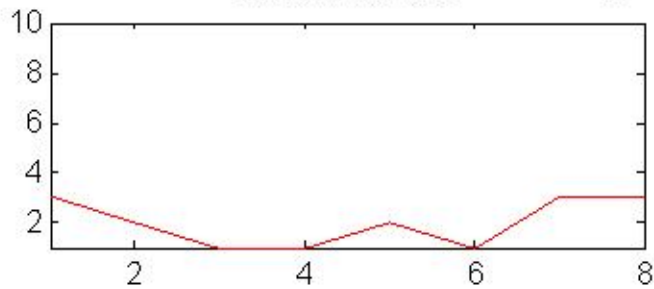
. Come, just as you are before your God.

Text file output

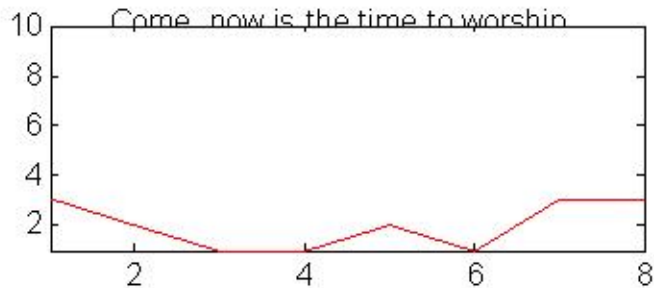


My Wife's piece

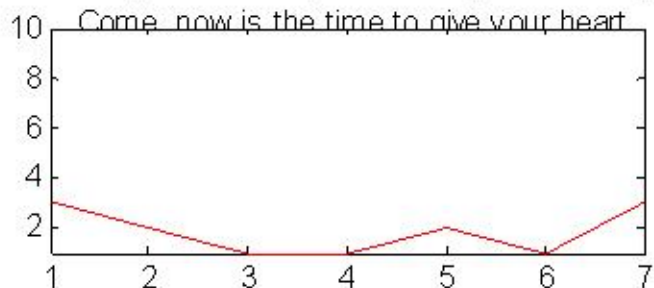
Emotional Data



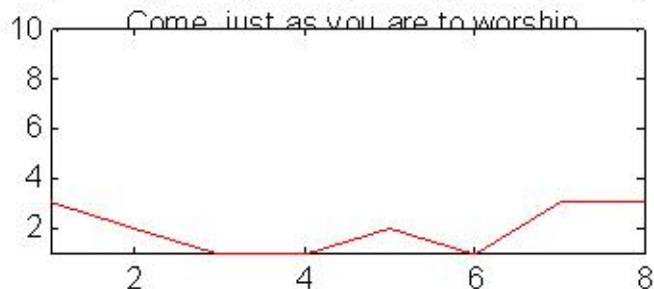
Come, now is the time to worship.



Come, now is the time to give your heart.

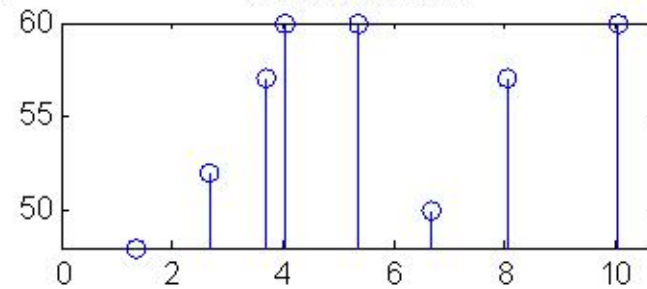


Come, just as you are to worship.

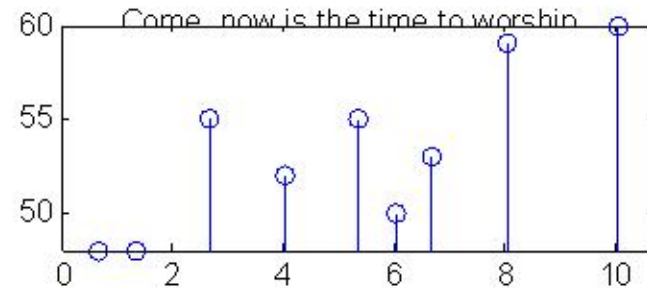


Come, just as you are before your God.

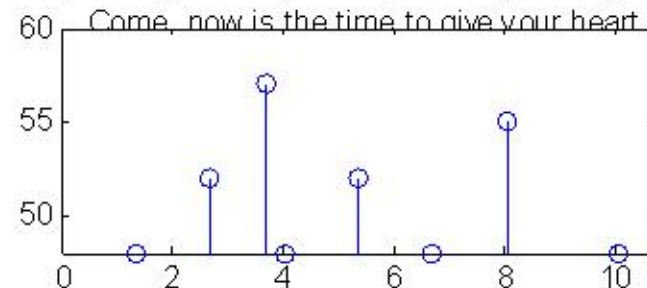
Note Generated



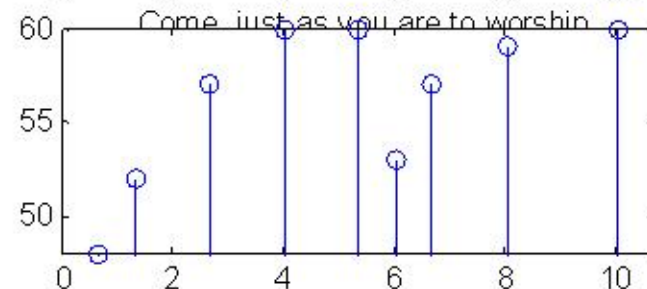
Come, now is the time to worship.



Come, now is the time to give your heart.



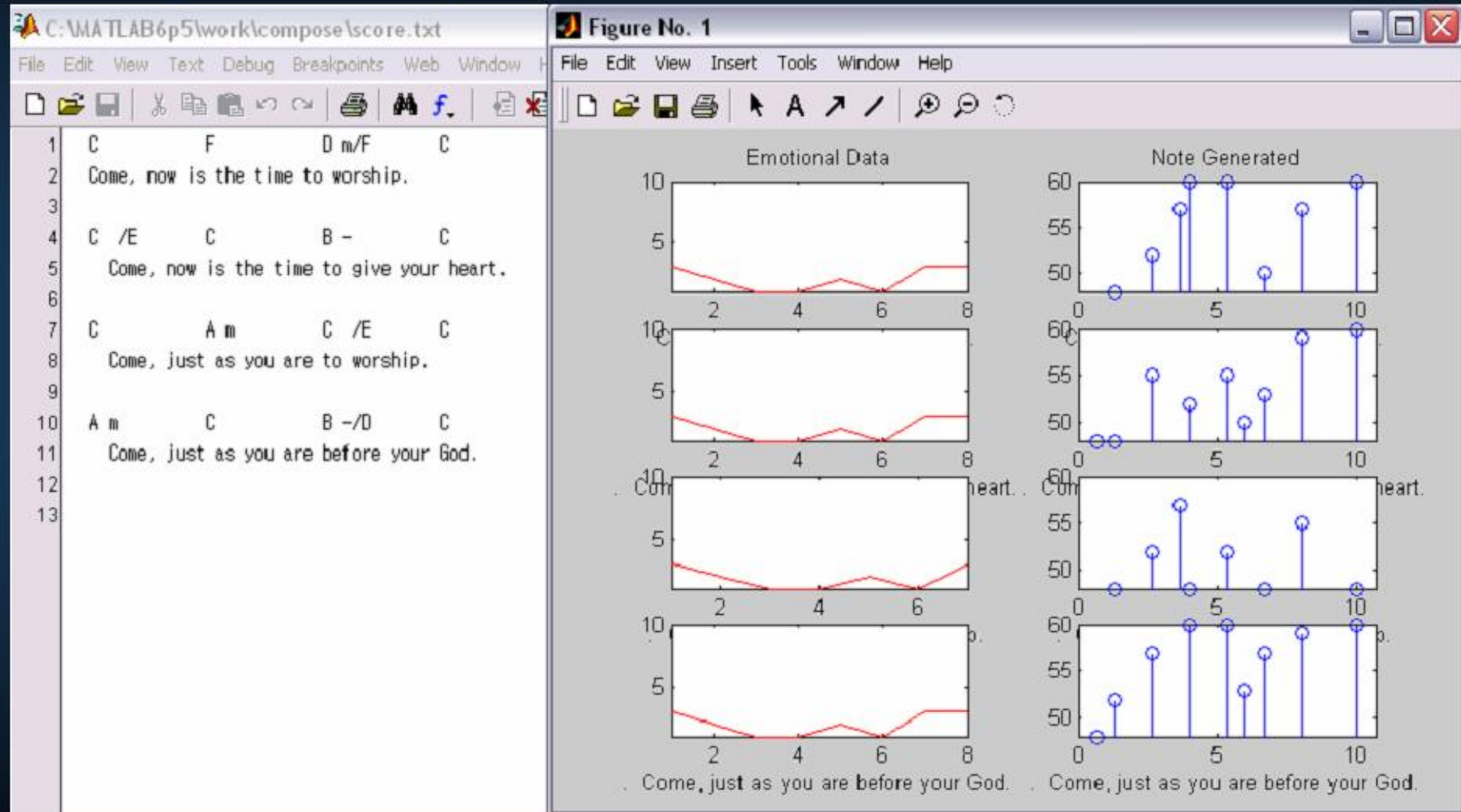
Come, just as you are to worship.



Come, just as you are before your God.



My wife's piece



Conclusion

- Good simple song generated
- Result can save with text score and wav file
- Limitations
 - Ok with sentence-based programming
 - Just bearable with phrase matching
 - Semitone based melody/chord can make more complicated song

Future works

- Various alternative chords (7th, 9th, add, dim, aug, ...) working
- Learning algorithm development from previous melody : choose one of many algorithm covered in this class
- User interface (GUI)
 - Easy input such as drawing emotional data
 - Reading a lyric can make a song

Thank you.

ISE575 / EE675
USC, Spring 2007

Beom soo Kim