Computer Music

Assignment 3

Stepwise Voice-Leading Algorithm

1 Objective

In this project you will implement a stepwise voice-leading algorithm, together with some variations on it, and use it to write a piece for piano and flute. The algorithm will output a MusicXML file scored for piano with minimal details. You will add dynamics and articulations, using the texture as raw material for a free artistic process.

You will write one class for this project, titled `VoiceLeading.java`. It should be located in `./src/main/java/org/delightofcomposition`.

2 Stepwise Voice-Leading

2.1 Create the file

Open a terminal and create the Java source file:

```
vi ./src/main/java/org/delightofcomposition/VoiceLeading.java
```

2.2 Add imports

Add the following imports to the top of `VoiceLeading.java`:

```
import java.util.ArrayList;
import java.util.Arrays;
import java.util.stream.Collectors;
```

2.3 Extend VoiceLeadingFramework

Make your class extend the provided abstract class:

```
public class VoiceLeading extends VoiceLeadingFramework {
    // Your implementation here
}
```

2.4 Implement abstract methods

Consult `VoiceLeadingFramework.java` for instructions and specs for each method.

2.5 Test with Texture A

Once you've implemented all abstract methods, you may uncomment the code labeled `TEXTURE A` in `./src/main/java/org/delightofcomposition/Main.java`.

2.6 Run the project

Run the project using VSCode with the RedHat extension, another IDE, or raw Maven in terminal:

```
mvn clean compile exec:java
```

2.7 View results

After executing, a file is created called `./composition.xml`. Open this in either MuseScore or a real notation software to see and hear the results.

3 Directed Voice-Leading

3.1 Implement Directed interface

Make `VoiceLeading` implement the `Directed` interface:

```
public class VoiceLeading extends VoiceLeadingFramework
    implements Directed {
    // Your implementation here
}
```

3.2 Implement directedVoiceLeading

Consult the `Directed.java` file for instructions and specs to implement `directedVoiceLeading`.

3.3 Test with Texture B

In `Main.java`, comment out Texture A and comment in Texture B.

3.4 Run and view

Run the project:

```
mvn clean compile exec:java
```

Close the old `composition.xml` file and open the new one.

4 Designing a Range Envelope

4.1 Load the envelope GUI

Design your own envelope to control range. First, load the included JAR executable:

```
java -jar ./src/main/java/org/delightofcomposition/envelopes/EnvGui.jar
```

4.2 Open and modify envelope

This will open an ugly GUI. Navigate to `File ⇒ Open ⇒ ./resources/envelopes` and open `envs.txt`.

> This is the pre-designed envelope that was used to produce the composition with directed voice-leading. Alter it or delete it and make a new one. The program will pick up any envelope you save as a text file in the `./resources/envelopes` directory.

4.3 Test your envelope

After designing your envelope, rerun the program and open the updated composition file. Be sure to close the old XML file in order to see the updates.

5 More Variations

5.1 Implement remaining interfaces

Implement the remaining interfaces, consulting their respective files for specs and instructions. After each implementation, test by commenting in the respective block in `Main.java` and executing.

```
public class VoiceLeading extends VoiceLeadingFramework
    implements Directed, NoCommons, NoCommonsDirected {
    // Your implementation here
}
```

5.2 Design your own algorithm

Feel free to design your own voice-leading algorithm within this framework, defining a different heuristic from those already covered.

5.3 Experiment with parameters

You may experiment with built-in parameters, such as `XMLWriter.ARPEGGIATE`, `XMLWriter.USEPEDAL`, and `XMLWriter.USESLURS`. Moreover, scales and chords may be changed within `./src/main/java/org/delightofcomposition/sequencer/Sequencer.java`.

5.4 Compose your piece

Compose a piece for flute and piano, using the texture(s) as raw material. For this assignment you will write for acoustic instruments. If you have extra time, you may experiment with using the algorithm for fixed media composition, including non-human playable tempos, densities, registers, etc.