

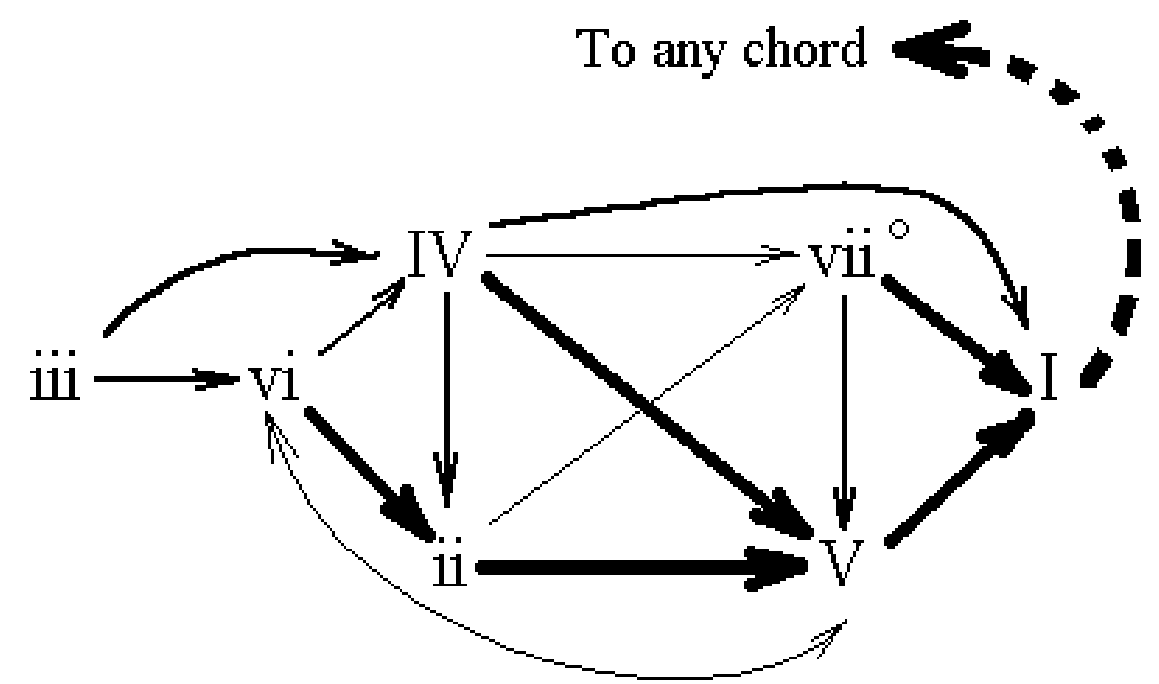
Automated Musical Part Writing

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Background

Musical part-writing is the process by which many composers write four-part chorals. This is a process that involves choosing a bass progression, making sure that all of the voices follow certain rules and do not cross, and making sure the overall piece makes musical sense. All of these constraints can be broken down into binary Boolean variables, which makes this a constraint satisfaction problem. Constraint satisfaction problems can be defined as mathematical problems that have a set of objects that must satisfy a set of constraints.



Major Key Chord Progressions

Sample Musical Output

Description

The program will first create a feasible bass progression in the user-defined allotment of measures using the major key chord progressions as described in the chart above. This bass progression is not final though, because it can possibly be changed by the constraint satisfaction code. Essentially, the progression becomes an auxiliary variable that affects the entire final music, so it's something else that the code has to account for.

Once this progression is set up, the code begins to fill in the harmonies and create a viable melody, while attempting to follow as many of the generally-accepted "good" methods for writing a melody. These are just guidelines however, so the melody will be different every

time. While it is going through the progression and attempting to harmonize, if there aren't any possible combinations that follow all of the constraints, it will change the progression so that it works.

When the program has completed the progression and all of the harmonization, it begins to put it into a format that will work for lilypond, which is a scripting language that engraves music for you. After all of the notes have been converted into a numerical format that will work for lilypond, the output is sent to the lilypond script and it outputs the finalized file. Included in the final pdf file are the user's name and the user-defined title. Also, it will automatically transpose the music into any key the user wants.

Analysis of Sample Output

As can be seen from the sample output, the melody doesn't necessarily follow the rules for melodic writing, i.e. in the first measure there are two consecutive leaps of a fourth. Often times, as in measure 14, it doesn't really seem to go anywhere and sounds relatively elementary. However, it does sometimes display qualities that weren't expected, i.e. the rhythmic and melodic sequence in measure 3-4. If one were to continue this project, making the melody more interesting would be the top priority.