

THE IMITATION OF MUSICAL STYLES BY A COMPUTER

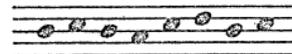
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A computer can be used to compose music in an attempt to create a work that can stand its ground amongst contemporary music. But this is not the only object one can pursue in letting a computer generate music. It is possible to translate a musical theory pertaining to a particular style, provided that it is sufficiently formalised, into a program, and then to compare the computer-generated music with the original pieces in that style. By this process we can tell to what extent the musical theory is able to account for the beauty and creativity we experience in the original music, and how much is left unexplained. A great difficulty in this process, aside from the fact that it need not be a trivial problem to translate even a completely formalised theory into a program, is that most of the existing books in musicology are rather ambiguously formulated.

In the present work, for the harmonic rules use has been made of Hindemith's book "A Concentrated Course in Traditional Harmony" [1]. The harmonic rules of the first chapters have been laid down in a program in the following way when a new four-voiced chord has to be generated, following an old tone, the program generates a great number of possible chords, each of which is checked against the harmonic rules, and for each trespass a fine is imposed, the size of which depends on the seriousness of the trespass. The resulting chord is that with the least total fine. An example of these rules is: no two voices that constitute an interval of a fifth may proceed along parallel lines to constitute another fifth.

It is not possible to give a detailed account of the composition process here, but it is hoped to give one in ref. [2]. The program was written in ALGOL 60 and ran on the Electrologica X8 of the Mathematical Centre. The central procedure is the procedure "compose", which composes a passage of, for instance, eight bars (preferably a power of two). The nature of this passage is controlled by a great number of parameters. The procedure subdivides the passage into two parts, and applies itself to each part, with suitably adjusted parameters. One of these parameters is the maximum height of the melody, which is used to generate the melodic line (this may be slightly altered later on, in order to fit in with the harmonies). From aesthetical considerations the idea is derived that the highest note of one half of a musical sentence should be slightly different from that of the other half; the same applies to the half sentence divided into two, etc. The following sequence of notes complies exactly with this rule:



Currently, the macrostructure of the composition, which is that of a classical string quartet, is controlled deterministically, from the level of complete musical sentences on.

To conclude, two fairly different examples are taken from the actual composition.

1. First sentence of the first movement:



2. Coda of the second movement:

Adagio

The musical score is written for four staves. The top two staves are in treble clef, and the bottom two are in bass clef. The tempo is marked 'Adagio'. The music consists of a melodic line in the upper staves and a harmonic accompaniment in the lower staves. The piece concludes with a final cadence.

REFERENCES

- [1] P. Hindemith, A Concentrated Course in Traditional Harmony.
- [2] L. Meertens, A Program for Composing in Traditional Harmony (Mathematical Centre, Amsterdam) (to appear).