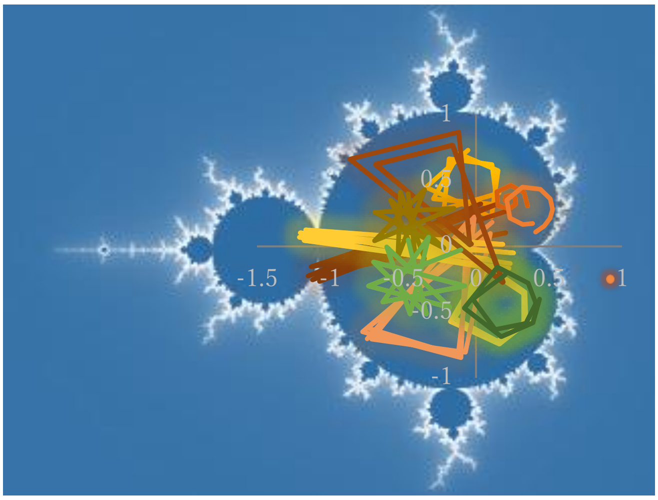
Title : The transfiguration of spring - A reminiscence work of Mozart's string quartet by nonlinear mapping –

Duration : 10 min.

Instruments : String Quartet

This is a string quartet piece composed by using the Mandelbrot set, which is one of the most popular nonlinear mappings whose visualization creates very beautiful images. Algorithmic composition by computer is one of my research interests and composition style, but I have to always take care to avoid creating music that sounds mechanical. The idea for this piece is to transfigure a beautiful, popular masterpiece using an interesting mathematical algorithm to re-harmonize the peculiar, unusual, and out-of-this-world musical notes with elements that are more in line with the original, beautiful impression of the masterpiece. By doing so, I hope this piece will give the audience surprises, stimulus, excitement, and more. This idea and approach were inspired by the paintings of Spanish painter Salvador Dali, such as the Archaeological Reminiscence of Millet’s Angelus.

In the Transfiguration of “Spring,” I created the original computer program to calculate the nonlinear mapping of the Mandelbrot set to determine the timing, pitch, and duration of the notes from the MIDI data of K.387 the “Spring” quartet. As shown by the colored (e.g., red and yellow) lines in the following figure, the output values are calculated recursively and depend on the initial parameters. I mapped these successive values to the score automatically using the computer program. However, I did not simply put the calculated notes on the score directly. Instead, I ran the program many times while changing the parameters of the Mandelbrot set to calculate lots of small strings of notes, and selected only parts I found agreeable to compose the piece while carefully considering the articulation, tempo, dynamics, and so forth.



Mandelbrot set and mapped values using original program

Transfiguration of “Spring quartet” by computer program

Recurrence formula and probram

$$z_{0,\ real} = c_{real}$$

$$z_{0,\ img} = c_{img}$$

$$z_{n,\ real} = (z_{n-1,\ real})^2 - (z_{n-1,\ img})^2 + c_{real}$$

$$z_{n,\ img} = 2\ z_{n-1,\ real}\ z_{n-1,\ img} + c_{img}$$

```
void calc_next_z(float z_real, float z_img,
         float c_real, float c_img,
         float *nz_real, float *nz_img)
{
         *nz_real = z_real * z_real - z_img * z_img + c_real;
         *nz_img = 2 * z_real * z_img + c_img;
}
```

Fig.3 Program for Mandelbrot mapping

Examples of transfiguration

Fig.4 Original music score "Spring quartet" by Mozart and the transfigured score by the computer program.

I. Introduction - Largo

Fig. 5 I. Introduction

II. Allegro vivace assai

Fig.6 II. Transfiguration 1

III. Lento Lamentoso

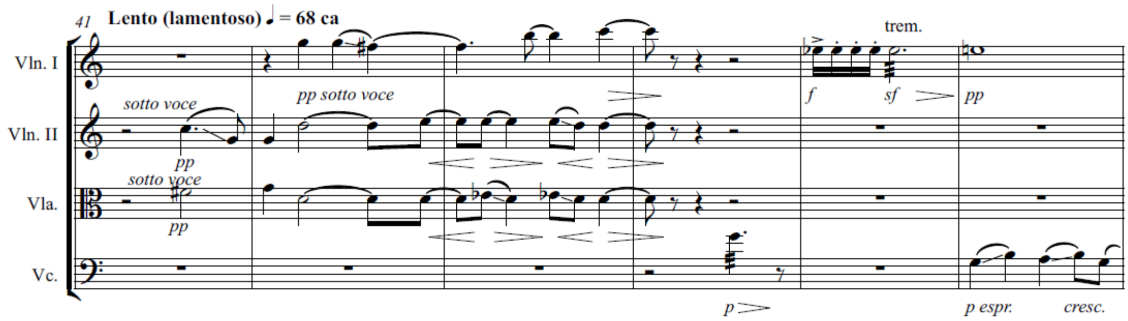


Fig.7 III. Transfiguration 2

IV. Allegro tempo giusto

Fig.8 IV. Transfiguration 3

V. Allegro assai

Fig.9 V. Transfiguration 4

VI. Grave - Lento

Fig.10 VI. Transfiguration 5

VII. Scherzo – Allegro ma non troppo – Poco meno allegro

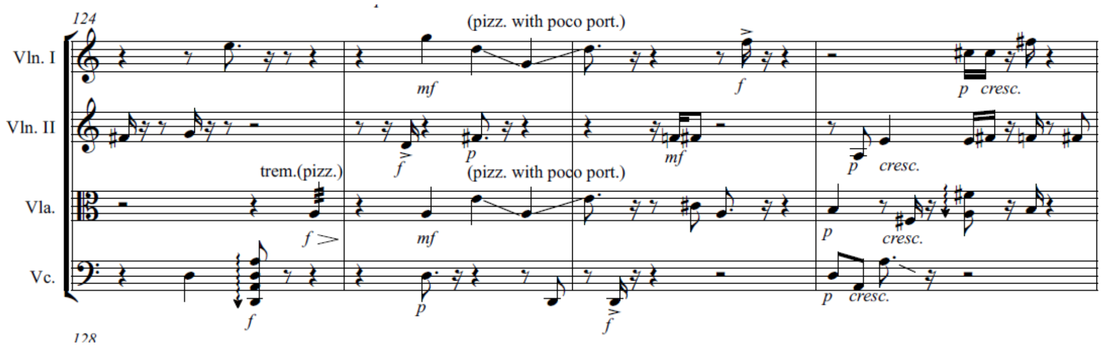


Fig.11 VII. Transfiguration 6

VIII. Andante 16

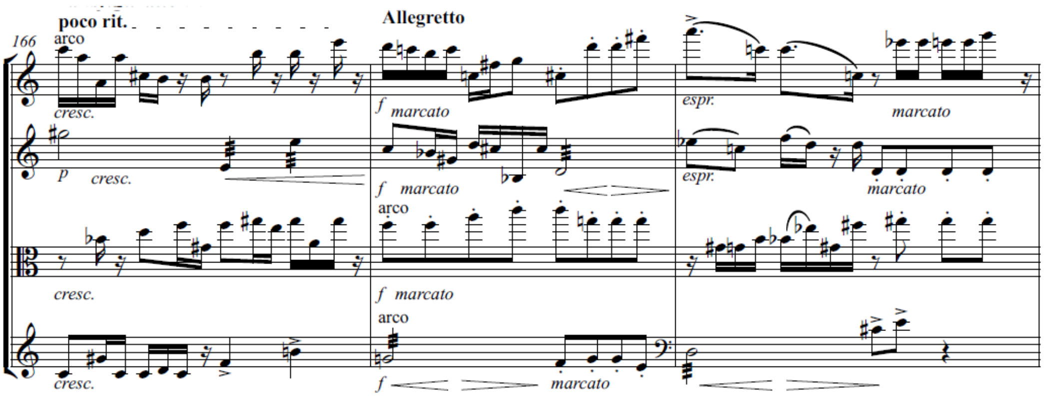


Fig.12 VIII. Transfiguration 7

IX. Finale

Fig.13 IV. Finale