In a second step, we would like to work on the terrain decoration: trees, rocks, and other visual components (forest, snow, rocks, …). During this project we will focus on the rendering style. Such a style has two main components: a geometrical deformation of the terrain so as to show important landmarks to the viewer and a specific rendering style to expressively describe the terrain features. The shadows shape are not realistic. Several abstraction approaches will have to be studied: filter-based techniques and vector graphics approaches will probably be needed.

By working with Arthur Novat (Pierre Novat son) we are able to understand the drawing process that was used to paint these panoramas. Based on these insights we will still have to devise concrete and general enough rules to be applied to generic terrains. Part of this work has been started in the team with two master students who are working on shading and shadows models for panoramas.

Based on these preliminary studies, the PhD student will first design a full shading model that will include specific style constraints:

- The shading should make the shape visible everywhere. For that we propose a shading model where the light direction is locally modified to align with the terrain features.
- The shadows shape are not realistic. Several abstraction approaches will have to be studied: filter-based techniques and vector graphics approaches will probably be needed.
- A specific color model will have to be proposed to blend shading and shadows.

In a second step, we would like to work on the terrain decoration: trees, rocks, and other visual elements that describe the nature of the terrain. For that, we plan to take inspiration from stroke-based rendering and element textures design approaches. One important question will be what type of control should be given to the designer.

Even if we take inspiration from the atelier Novat style, care will be taken to propose general approaches that should be applicable for generic terrain rendering.

Bibliography

Panoramas

- R. Balzarini and M. Murat. The effectiveness of panoramic maps design: A preliminary study based on mobile eye-tracking. International Archives of the Photogrammetry, Remote


Shading

Element texture and stroke-based rendering

Reference book
- Image and Video-Based Artistic Stylisation. Editors: Paul ROSIN, John COLLOMOSSE. 2013

Principales activités
The PhD will start by a bibliography stage and some preliminary experiments understanding.

Then the candidate will work on shading and shadows before addressing the remaining visual elements of the panorama style.

Avantages
- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
- Possibility of teleworking (after 6 months of employment) and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training
- Social security coverage

Rémunération