Shading and shadowing in panorama maps

Inspired by the "atelier Novat" style

Context

The Atelier Novat has been founded by Pierre Novat in the 60's and became the French standard for mountain panoramas: http://atelier.novat.free.fr. Our goal in this project is to reproduce and extend the atelier Novat style using digital means. 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 components (forest, snow, rocks, …). During this project we will focus on the rendering style.

The panorama case study is very interesting for the stylization of 3D scenes question. This is a very specific application where the goal is to represent a terrain so as to help the viewer to understand the shape and nature of the terrain but also to provide an aesthetic pleasant view of the landscape. This is also an application in which we can explore the designer creative process and try to find an efficient compromise between fully manual design and automatism. 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.

Project

The student will have to design a full shading model with specific style constraints:

- The shading should make the shape visible everywhere. For that we began to design 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.

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

- Tom PATTERSON. A view from on high: Heinrich Berann's panoramas and landscape visualization techniques for the us national park service. Cartographic Perspectives, (36): 38–65, 2000.
- Tom PATTERSON. Looking closer: A guide to making bird's-eye views of national park service cultural and historical sites. Cartographic Perspectives, (52):59–75, 2005.
- Margarita BRATKOVA, Peter SHIRLEY and William B THOMPSON. Artistic rendering of mountainous terrain. ACM Trans. Graph., 28(4):102–1, 2009.
- 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 Sensing & Spatial Information Sciences, 41, 2016.
- S. Alex BROWN and Faramarz SAMAVATI. Real-time panorama maps. In Proceedings of the Symposium on Non-Photorealistic Animation and Rendering, page 6. ACM, 2017.

Shading

- Pascal BARLA, Joëlle THOLLOT et Lee MARKOSIAN. X-toon: an extended toon shader. In Proceedings of the 4th international symposium on Non-photorealistic animation and rendering, pages 127–132. ACM, 2006.
- Szymon RUSINKIEWICZ, Michael BURNS and Doug DE CARLO. Exaggerated shading for depicting shape and detail. In ACM Transactions on Graphics (TOG), volume 25, pages 1199–1205. ACM, 2006.

- Jorge LOPEZ-MORENO, Veronica SUNDSTEDT, Francisco SANGORRIN and Diego GUTIERREZ. Measuring the perception of light inconsistencies. In Proceedings of the 7th Symposium on Applied Perception in Graphics and Visualization, pages 25–32. ACM, 2010.
- Romain VERGNE, Pascal BARLA, Georges-Pierre BONNEAU and Roland W FLEMING. Flow-guided warping for image-based shape manipulation. ACM Transactions on Graphics (TOG), 35(4):93, 2016.

Reference book on expressive rendering

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

Supervision

The project will take place in the [Maverick](#) team at Inria and be supervised by Joelle Thollot, Romain Vergne and Nolan Mestre.