


Geomatics Projects MSc or Master Thesis HS 2023

Chairs / Institutions (incl. e-mail)	Chair of Cartography
Leading professorship	Prof. Dr. Lorenz Hurni (lhurni@ethz.ch)
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Project title	Automatic Map Storytelling with Generative Pre-trained Transformer (GPT) Models
Abstract and work packages	<p>Maps provide information and knowledge about the world. Different types of maps like topographic maps, thematic maps, road maps, etc, can help us to understand the geography, economics, history, and culture of a certain place.</p> <p>However, due to the wide range of map styles and thematic/temporal contexts, it is not always straightforward for a non-domain expert to identify and understand maps, especially historical ones.</p> <p>Thanks to the recent development of image captioning methods like CoCa¹ and ClipCap², it has been possible for machines to automatically classify and describe images. These methods make use of GPT models, which are pre-trained on large datasets of texts extracted from books, articles, and websites, to generate reasonable texts that correspond to the input images. The goal of this project is to explore GPT models for map storytelling. Given an input map, the model should not only tell “where” (the location), and “what” (the map type and a brief explanation of the map contents), but it should also tell “why” to extend the contextual information.</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 20px; background-color: #fff9c4; border-radius: 15px; padding: 10px; width: 300px;"> <p>The pictorial map depicts fish hooked in different places in North America for game fishing. 56 kinds of fish are shown at the border. (where + what)</p> <p>Game fishing, also known as sport fishing, is a form of recreational fishing in which the primary goal is to catch fish for sport rather than for commercial purposes. (why)</p> </div> </div> <p>An example of map story telling. Left: the input map³. Right: the expected caption that contains “where”, “what” and “why”.</p> <p>The project consists of two main work packages:</p> <ul style="list-style-type: none"> - assemble a map dataset from online libraries like David Rumsey Map collection⁴ with the corresponding captions generated from the metadata automatically; - fine-tune the pre-trained image captioning models using the collected data for map story telling. <p>¹ https://github.com/mlfoundations/open_clip ² https://github.com/rmokady/CLIP_prefix_caption ³ https://www.davidrumsey.com/luna/servlet/detail/RUMSEY~8~1~260718~5522992 ⁴ https://www.davidrumsey.com/</p>
Number of students per group (1–3)	Project Work: 1–2 Master Thesis: 1
Maximum number of groups	1
Language (incl. report, oral presentation and poster)	English