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Leveraging Large Language Models for Content Modeling and Assessment of National Flood Adaptation Plans

With millions of people exposed, global riverine flood risk is one of the major natural hazards worldwide, having caused an estimated direct average annual loss of US$ 104 billion (2015 values) and 7 million fatalities in the twentieth century. Amidst increasing calls for accelerated climate adaptation, including the recent UNEP report, a pivotal question remains: what are the status, effectiveness, and potential of adaptation efforts to reduce future flood risks? National adaptation plans are key instruments in climate risk governance driving adaptation, yet their length and heterogeneity poses challenges to a systematic and automated comparison. Extracting structured insights from these plans requires advanced methods from natural language processing (NLP) and machine learning.

This project develops large language model (LLM)-based methods for topic modelling and content analysis of national flood plans. Our workflow combines text preprocessing, embedding, and guided topic modelling that incorporates 18 predefined flood adaptation measure categories from the EU Floods Directive. This enables structured analysis of adaptation measures, assessment of their diversity and prevalence across countries and regions, and exploration of correlations with hazard characteristics, damages, and economic indicators. In addition, the workflow supports the detection of emerging or overlooked adaptation strategies.
(Project ongoing)

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