D4.1 - Exploring new ML models

This report corresponds to Deliverable D4.1 - Exploring new ML models of the SustainML project and is structured into four parts: First, we report qualitative studies to better understand the current awareness of ML and HCI experts on their impact on sustainability. We then present a framework that structures the different intersections between sustainability with ML and HCI and describe the resulting research areas based on recent work. In the third part, we focus on HCI for sustainable ML and how human-centered design practices can be used to support more sustainable ML development throughout the entire life-cycle of systems. We define various impacts of ML systems and propose strategies to mitigate these impacts, including data collection, model training, and recycling. To anticipate later stages and impacts in the life-cycle, however, requires ML experts to express realistic project requirements before starting a ML project, which can be challenging. Following a more human-centered design approach, we examine how current decisions in the early stages are made based on interviews with eight ML experts, which we describe in the last part of this deliverable.

In order to promote energy efficiency and avoid AI-waste throughout the entire life-cycle of ML applications, however, developers need the ability to make environmentally conscious decisions from the start. Our analysis of current sustainability awareness and existing work at the intersection of HCI and ML shows the potential for using HCI methods to redefine the life-cycle of ML models by supporting sustainable actions through human-computer collaboration. Our final objective is to create tools that help ML practitioners understand how a certain decision affects the environment and guide them in identifying suitable, more environmentally friendly models for their projects. This deliverable provides the background for developing such tools, which will be presented in later deliverables.