



Automated water level and water surface velocity calculation from multimedia

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Flood risk prediction has been traditionally based on models that are developed from time-series data collected over long periods of time from expensive and hard to maintain in-situ sensors available only in specific areas.

Scent is an EU project which provides an integrated toolbox of smart, collaborative and innovating technologies that augment costly in-situ infrastructure, enabling citizens to become the 'eyes' of the policy makers. This is done in the context of monitoring Land Cover (LC)/ Land Use (LU) changes in their everyday activities and related environmental phenomena like floods by crowdsourcing relevant information.

Experts in the field of flood models define areas of interest through a specifically designed tool and ask volunteers to collect specific data needed at these areas. These data may include images that are processed through an intelligent, AI-enabled processing engine and classified based on a LC/LU taxonomy; sensor measurements from low-cost portable environmental sensors or river measurements.

In order to obtain consistent and high accuracy river measurements, using inexpensive and easily accessible devices, from volunteers that have no technical knowledge two tools have been designed that take advantage of the information contained in simple multimedia files (images and videos) generated by smartphones.

The Water Level Measurement Tool uses state of the art image recognition techniques in order to extract the water level from images containing a measuring tape. The tool can extract features of the input images and match them with pre-calculated models invariant of rotation, luminance variation, image noise or scale. Any already available measuring tapes can be used but if such infrastructure is not available the installation of low-cost measuring boards made of rigid foam is proposed as they are light-weight, easy to transport, resistant against climate influences and easy to install at any area of interest.

The Water Velocity Calculation Tool uses state of the art video processing algorithms in order to extract the water surface velocity from a video containing a pre-defined floating object moving on the surface of a water body. The tool is resistant to noise introduced to the video by intentional or unintentional movement of the camera. The proposed floating object is a tennis ball as it is low-cost, re-usable and widely available.

Each measurement estimation extracted by the two tools is accompanied by a degree of trust that depends on the quality of the input data. The tools have been designed so that a high degree of trust can be achieved from images and videos taken from regular smartphones.

The crowdsourced river measurements are used to develop improved flood models with a dramatically reduced cost, given that both the measuring tapes and the floating objects required are low-cost and re-usable, while effectively covering large areas of interest.