FOOD & BUSINESS APPLIED RESEARCH FUND

Ground Cover App to Drive an Irrigation Scheduling Service in the Delta Region of Bangladesh

Consortium Members

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Project description

Aim: The aim of the project is to develop a smartphone application to drive irrigation services of farmers of the southern delta of Bangladesh during the dry season.

Objectives:

- Develop a user friendly app that enables farmers to capture photos of their fields/crops with standard smartphones.
- Analyse the photos to estimate the percentage of ground cover.
- Transmit the ground cover estimates to a server and integrate them into an advisory system to schedule irrigation requirements in real time.
- Ensure that women and illiterate farmers will get access to the technology by including them in the training.

RGB image of ground cover

Estimation of groundcover

Method: A mobile app will be developed. This app will enable farmers to take RGB photos of their fields and to get the percentage of ground covered by crops. Various machine learning approaches will be tested to calculate the ground cover estimates. This estimates will be integrated into the Irrigation Advisory System of CIMMYT, which will notify farmers about the water requirements and also inform them about available irrigation service providers.

Anticipated Impact: The project is anticipated to increase food production and, hence, improve food security. In the long run, it will be an integrated service for farmers, input suppliers and buyers.

Impact activities and preliminary results

Impact Activities:

- The accuracy and robustness of the ground cover estimation algorithm will be tested using various mobile phones and for various crops.
- After development of an interface for the ground cover app, a training program will be organized with farmers, irrigation service providers and agricultural extension agents.
- The pilot testing of the ground cover app under field conditions will be done by the end users.
- Official government endorsement will be gained by validation of the irrigation scheduling algorithm in collaboration with the Bangladesh Agricultural Research Council (BARC).
- An integrated service program will be established by the participation of NGOs, Department of Agricultural Extension (DAE), Irrigation service providers (ISP) and farmers.
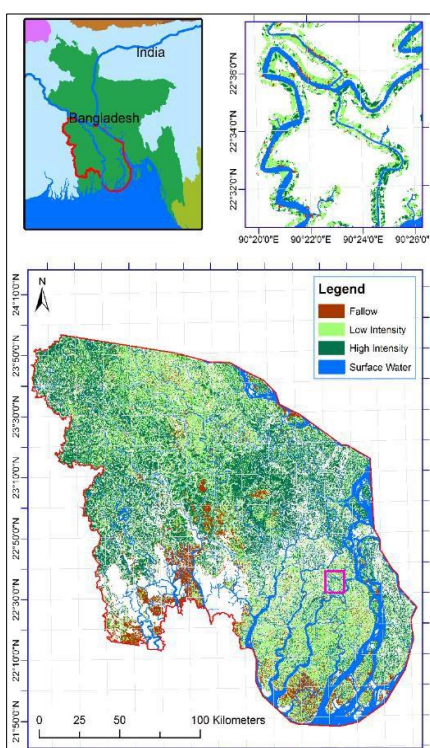- Two coordination meetings will be organized to ensure successful execution of the project.

Use of Octocopter to capture multi-spectral images

Irrigation of Land as per requirement

Opportunities and challenges

Opportunities:

- Because of small land parcel sizes, satellite data has limited applicability on farmers' fields in Bangladesh. The use of smartphone derived ground cover data will make the irrigation advisory system independent from satellite data.
- Positive synergies with the STARS project conducted by the same consortium members and that provided CIMMYT all the necessary equipment, and an octocopter equipped with a multispectral camera.
- Grounded on existing research for which on farm demonstration trials have been conducted by CIMMYT, which give access to many farmers and irrigation service providers.
- ITC has extensive expertise in developing solutions to spatio-temporal problems in emerging economies. Spill overs to other regions possible.
- Surface water based irrigation will ensure sustainable intensification and diversification of high yielding crop production in the delta region of Bangladesh.
- Proposed co-creation of knowledge involving both local and outsider actors will enhance local capacities.

Challenges:

- The target audience are disadvantaged groups. The overall success depends on the effective training on operation of smartphone by this group.
- The robustness of the ground cover algorithm is challenged by confounding factors such as soil surface wetness, illumination conditions, shadows, and crop residues.
- The algorithm will also have to work for crops with contrasting leaf shapes and canopy architectures as three types of crops are involved i.e. wheat, maize and mung bean.
- The best option for image processing and data transfer to the irrigation server have to be chosen by running various tests with farmers through (i.e. trial and error approach).