

Dupas

Bayesian learning for decision support in the Internet of phytosystems things

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The international laboratory Bio_inca “Biodiversity of natural and cultivated tropical andean phytosystems” groups researchers from IRD France, Uniandes Colombia, and PUCE Ecuador in the areas of genetic, ecology, ecosystem services and modelling. We present here a development from this laboratory consisting on a generic algorithm to learn decision support model on phytosystem dynamics from real-time series data. The approach consists on building the model based on the relevant field data we do have : usually incomplete and multiple source, including epidemiological, genetic, ecological and socio-economical. Scientific hypotheses, models and experiments are used as prior in a Bayesian scheme that combines likelihood and simulations. We present the general algorithm and its declination to potato epidemiological modelling.

With this approach we aim to structure an Internet of phytosystems that connect real-time series with ecological models. Sampling devices can now be connected in real-time to the cloud from almost everywhere at low velocity and low cost. They can include in-farm biophysical sensors, remote imagery, and participative science smart-phones application or text telephones. Such devices can send data and/or receive decision support. They have to be designed based on social evaluation of small farm-holders attempts and relationships to technologies of information and communication.

We are finally making a call on phytosystem community to build an open-source global real-time social ecological database on phytosystems. The purpose is to develop decision tools that facilitate inputs cost reduction (pesticides fertilizers), ecological intensification, and land use, market, and value chain optimization, at the different scales.