Contribution ID: **15**   Type: **not specified**

A biophysical model for the evolution of Portuguese agriculture using artificial learning

Thursday 6 February 2020 12:38 (11 minutes)

The Portuguese agricultural sector has undergone substantial changes in the last half century as a consequence of increased industrialization and the entry into the European single market. In the near future, new challenges will emerge such as the need to compete with new and emerging markets and to adapt to environmental issues such as climate change and resource shortages, achieving sustainable production. The goal of the thesis will be to help develop a biophysical model for the evolution of Portuguese agriculture that explains how materials, land and energy have been used to produce value for the Portuguese economy, and apply the model to produce forecasts of plausible sustainable pathways for the future of the sector. The work will be carried out at the macro level, taking the entire Portuguese agricultural sector as a whole.

This goal will require the compilation of available time series of land use, resource use and output of the sector, including cropland, forest and animal products. Time series should go back until the 1960's. In case data is missing, the work will involve the application of data filling and extrapolation methods for completing the time series. Using the time series data, the work will involve the application of machine learning/artificial intelligence tools for analyzing hidden patterns in the data and establishing connections between variables. As mechanistic relationships between variables are unknown and conventional statistics is limited by high covariance and indeterminate causality, the application of an advanced toolkit drawn from Physics and Computer Science will attempt to produce clarity regarding the interdependencies between drivers of change and outcomes.

The work will be embedded in the project "Intergenerational Impact of Biophysical Resource use in Portugal Within Planetary Environmental Boundaries". The project will estimate the impact of biophysical resource use by different generations in Portugal and relate that resource use to global environmental boundaries, providing explanatory hypotheses to rationalize observed trends. The project will also estimate what each generation received from the previous generation and left to the next.

Author: COSTA, Bruno (Instituto Superior Técnico)

Presenter: COSTA, Bruno (Instituto Superior Técnico)