

## 3<sup>rd</sup> 'GIOVANNI ANANIA' SUMMER SCHOOL ON EVIDENCE-BASED POLICY MAKING

### "Machine Learning techniques in agricultural, food and environmental policy analysis"

13-17 July 2020

**ONLINE**

**Revised call for applications**

#### **BACKGROUND**

On July 15<sup>th</sup> 2015 Giovanni Anania suddenly passed away. Giovanni was a pillar in the profession and a natural academic leader for young agricultural and international economics scholars. He also was an institutional leader, serving as president of the European Association of Agricultural Economists (EAAE), and at the University of Calabria, where he served as Head of the Department of Economics as well as a member of the University Executive Board.

To honor Giovanni, the Italian Association of Agricultural and Applied Economics (AIEEA), the Rossi-Doria Center, the Research Centre for Agricultural Policies and Bioeconomy of the Council for Agricultural Research and Economics (CREA) and the University of Calabria have organized the 3<sup>rd</sup> edition of the Summer School for PhD students and young researchers, a constant focus in Giovanni's mentoring role.

#### **OBJECTIVES**

Machine learning (ML) now offers great potential for expanding the applied economist's toolbox. Data availability has dramatically increased and ML methods are well equipped to exploit large volumes of data more efficiently than traditional statistical methods. Researchers have developed and improved algorithms that push the boundaries of ML. The community has a strong open source tradition, including powerful DL libraries (e.g. tensorflow.org, pytorch.org) and pretrained models (e.g. VGGNet, ResNet), increasing the potential for adoption. In the past few years, economists have begun to realize that the predictive power of ML methods may not only be used as such, but can also improve causal identification. In this course, we introduce ML to applied economists by placing it in the context of standard econometric. We identify shortcomings of current methods used in agricultural and applied economics, and discuss both the opportunities and challenges afforded by ML to supplement our existing approaches.

The 3<sup>rd</sup> Giovanni Anania Summer School on Evidence-based policy making provides an introduction to the use of machine learning techniques and introduces students to their use in agricultural, food and environmental policy analysis.

#### **APPROACH**

The overall objective of the Summer School is to train young applied economists in the field of

policy analysis.

The Summer School is organized as a series of theoretical lectures on methodological issues coupled with up-to-date empirical sessions focused on the computer-based applications of the same techniques.

Due to the coronavirus emergency, **the 2020 school will be held online**, but the organization on the classes and the technological solutions will guarantee a close interaction between participants and instructors.

Please note that some of the theoretical lectures will be made available in advance as recorded material, while most of the practical activities will be held online at the time established in the Programme below.

## INSTRUCTORS

*Kathy Baylis* - University of California, Santa Barbara, USA

*Giovanni Cerulli* - IRCRES-CNR, Rome, Italy

*Gianluigi Greco* - Università della Calabria, Rende, Italy

*Thomas Heckeley* - University of Bonn, Germany

## PROGRAMME

### Monday, July 13

Intro, prediction versus estimation, overfitting and regularization - **Kathy Baylis, Thomas Heckeley**

- 09:00-10:30 Recorded Lecture 1a: Introduction to ML basics
- 10:30-12:00 Recorded Lecture 1b: Penalized regressions
- 12:00-13:00 Questions and Answers on the recorded material
- 13:00-14:30 *lunch break*
- 14:30-15:30 **Lab 1a: Introduction to Jupyter Notebooks and summary stats using Python**
- 15:30-16:00 *break*
- 16:00-17:00 **Lab 1b: Comparing OLS, LASSO, Ridge and ElasticNet**
- 17:00-18:00 **Unstructured lab time**

### Tuesday, July 14

Trees, forests and how to not get lost (Interpretability vs complexity) - **Kathy Baylis, Thomas Heckeley**

- 09:00-10:30 Recorded Lecture 2a: Tree-based methods
- 10:30-12:00 Recorded Lecture 2b: Interpretation
- 12:00-13:00 Questions and Answers on the recorded material
- 13:00-14:30 *lunch break*
- 14:30-15:30 **Lab 2a: prediction using tree-based methods**
- 15:30-16:00 *break*
- 16:00-17:00 **Lab 2b: Interpretation using Effects Plots (PDP, ICE) and Shapley Values**
- 17:00-18:00 **Unstructured lab time**



### Wednesday, July 15

#### Neural networks - **Gianluigi Greco**

- 09:00-10:00 Recorded Lecture 3a: Introduction to Neural Networks
- 10:00-11:00 Recorded Lecture 3b: Neural networks for regression, binary classification, and multiclass classification
- 11:00-12:00 Recorded Lecture 3c: Analysis of time series, advanced network architectures
- 12:00-13:00 Questions and Answers on the recorded material
- 13:00-14:30 *lunch break*
- 14:30-15:30 **Lab 3a: Examples of Neural Networks on real-world data**
- 15:30-16:00 *break*
- 16:00-17:00 **Lab 3b: Examples of Neural Networks on real-world data**
- 17:00-18:00 **Unstructured lab time**

### Thursday, July 16

#### Machine Learning for causal analysis - **Kathy Baylis, Thomas Heckeley**

- 09:00-10:30 Recorded Lecture 4a: Model selection, Matching and Doubly robust regression
- 10:30-12:00 Recorded Lecture 4b: Overview of methods for causal ID
- 12:00-13:00 Questions and Answers on the recorded material
- 13:00-14:30 *lunch break*
- 14:30-15:30 **Lab 4a: LASSO for model selection and PSM**
- 15:30-16:00 *break*
- 16:00-17:00 **Lab 4b: Double ML using LASSO as selection**
- 17:00-18:00 **Unstructured lab time**

### Friday, July 17

#### Superlearning Machine and Stata-Python Integration - **Giovanni Cerulli**

- 09:00-10:30 Online Lecture 5: The ontology and practice of Machine Learning: an overview
- 10:30-12:00 Personal study by students on the lecture material
- 12:00-13:30 *lunch break*
- 13:30-14:30 **Lab 5a: The superlearning machine for predicting economic outcomes**
- 14:30-15:30 **Lab 5b: The Stata/Python integration for Machine Learning purposes**
- 15:30-16:00 *break*
- 16:00-17:00 **Unstructured lab time**

### ADMISSION

The Summer School welcomes applications by PhD students at any stage of their PhD as well as young researchers who have completed their PhD. Applicants are welcome from any areas of applied economics, with a preference for those specializing in agricultural, food, environmental, trade, and development economics. Students must have taken an intermediate econometrics class to be admitted.

Given the highly interactive activities planned at the School, the number of participants is limited to 50. Admission priority will be given to students of the AFEPA Consortium ([www.afepa.eu](http://www.afepa.eu)), of the University of Calabria and of the University Roma Tre.



Please submit your curriculum vitae and a letter of reference. Applications must be submitted in English using the attached form by **June 5<sup>th</sup>** to the following email address: [summer.school.anania@gmail.com](mailto:summer.school.anania@gmail.com)

Proposals will be reviewed by the Summer School Scientific Committee.

Notification of acceptance will be provided to applicants by **June 15<sup>th</sup>**. The selected applicants are required to pay a registration fee by **June 30<sup>th</sup>** (**50 euros** for all participants and **30 euros** for AIEAA Members. The Summer School is free of charge for Phd students from University of Calabria and from Roma Tre University). After this deadline, the selected applicant who has not completed the registration will not be entitled to participate and the opportunity will be given to the next person in the selection ranking.

Certificates are provided to participants attending the entire school with information on course coverage.

## ORGANISATION

The Third Giovanni Anania Summer School will be held online from **13<sup>th</sup> to 17<sup>th</sup> July 2020**.

In the week before the school, all confirmed participants will receive instructions on how to attend the school through the online resources of the University of Calabria ([www.unical.it](http://www.unical.it)), Department of Economics, Statistics and Finance. They will be informed by email on the platform to be used for the connections, on the (free) softwares to be installed on their personal computers and on when and how the recorded material will be made available in preparation to the school.

Further information are available at [http://www.desf.unical.it/summer\\_school\\_anania\\_2020](http://www.desf.unical.it/summer_school_anania_2020) .

## SCIENTIFIC COMMITTEE

Anna Carbone, Tuscia University  
Frédéric Gaspart, Université Catholique de Louvain  
Thomas Heckeley, University of Bonn  
Ruben Hoffmann, Swedish University of Agricultural Sciences, Uppsala  
Rosanna Nisticò, University of Calabria  
Donato Romano, University of Florence  
Luca Salvatici, Roma Tre University  
Paolo Sckokai, Università Cattolica del Sacro Cuore  
Margherita Scoppola, University of Macerata  
Hugo Storm, University of Bonn



## 'GIOVANNI ANANIA' SUMMER SCHOOL APPLICATION FORM

FIRST AND MIDDLE NAME:

FAMILY NAME:

DATE OF BIRTH (dd/mm/yy):

CITIZENSHIP:

AFFILIATION:

POSITION:

ADDRESS:

POSTAL CODE:

CITY:

COUNTRY:

PHONE NUMBER:

FAX NUMBER:

E-MAIL:

URL:

NAME OF PHD PROGRAM:

DISSERTATION TOPIC:

COMPUTER PACKAGES  
BACKGROUND (e.g., STATA,  
GAMS, R, etc.):

According to article 10 of law no 675 dated 31 December 1996 and subsequent DLgs 196/2003, amending provisions on the "Protection of individuals and other subjects with regard to the processing of personal data", we inform you that the personal data provided by you will be used in accordance with the law mentioned above and with the concept of confidentiality that our activities comply with. With the following confirmation, the user express his/her consent to the use of his/her personal details for receiving information about the Summer School and for the participant list.