Course number	G-AGR06 7FC05 LJ82		
Course title (and course title in English)	生物資源経済学特別講義 IVA Special Lecture on Natural Resources Economics IVA	Instructor's name, job title, and department of affiliation	Part-time Lecturer,Xiaohua Yu

Target year	1st year students or above	Number of credits	1	Year/semesters	2023/Intensive, First semester
Days and periods	Intensive	Class style	Lecture	Language of instruction	English

[Overview and purpose of the course]

【This intensive course, themed “ Introduction to Machine Learning for Agricultural and Food Economics, ” will be delivered in person by Dr. Xiaohua Yu, Professor (with Chair) of Agricultural Economics in Developing andTransition Countries at the Department of Agricultural Economics and Rural Development, the University of Goettingen, Germany.】

Machine learning is changing the world from different dimensions, and agricultural and food economics is no exception. In contrast to econometrics of causal analysis, machine learning put more emphasis on prediction and pattern recognition. This course will briefly introduce machine learning algorithms for research of agricultural and food economics. It will help students to master bask techniques in programing R (or Python) for machine learning.

[Course objectives]

This course will introduce basic algorithms in machine learning and apply them to research of agricultural and food economics. Specifically, we will introduce R (or Python) language, and how to use R (or Python) to realize feature engineering, linear regression, logit model, support vector machine, k-nearest neighbor, random forest, k-means clustering and neural network.

[Course schedule and contents]

【The course dates have not yet been finalized, but this course will be held in person most likely in late July 2023. Further details (dates, time, classroom, etc.) will be announced later.】

Lecture 1)
Introduction to R (or Python) and application of machine learning in agricultural economics

Lecture 2)
Plotting the data

Lecture 3)
Linear regression and Feature Engineering

Lecture 4)
Logit model and support vector machine

Lecture 5)
k-nearest neighbor and discrimination analysis

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Lecture 6)
Classification and random forest

Lecture 7)
Neural network

Lecture 8)
k-means clustering and unsupervised learning

[Course requirements]

Understand the basic models taught in the class and use a software to analyse the given data.

[Evaluation methods and policy]

Able to analyze data with the models taught in the class and explain the results as well.
Participation (20%), exam (50%) and homework (30%)

Refer to "2023 Guide to Degree Programs" for attainment levels of evaluation.

[Textbooks]

Lesmeister C. 2015, “Master Machine Learning with R”, Packt Publishing.

[References, etc.]

（Reference books）

1) Wang H. , X. Yu (2023) “Carbon Dioxide Emission Typology and Policy Implications: Evidence from Machine Learning”. Forthcoming in China Economic Review.

2) Wang H., J. F. Feil and X. Yu (2023) Let the Data Speak about the Cut-off Values for Multidimensional Index: Classification of Human Development Index with Machine Learning. Forthcoming in Socio-economic Planning Sciences.

3) Maruejols L., L. Hoeschle, X. Yu (2022) Vietnam between economic growth and ethnic divergence: A LASSO examination of income-mediated energy consumption. Energy Economics.

4) Liu C., Zhou L., Hoeschle L. And X. Yu (2022), Food Price Dynamics and Regional Clusters: Machine Learning Analysis of Egg Prices in China. Forthcoming in China Agricultural Economic Review.

5) Graskemper V., X. Yu and Jan-Henning Feil (2022) Values of Farmers-Evidence from Germany, Journal of Rural Studies. Vo. 89:13-24.

6) Wang H., L. Maruejols, and X.Yu (2021) Predicting energy poverty with combinations of remote-sensing and socioeconomic survey data in India: Evidence from machine learning. Energy Economics. Vol. 102, 105510. https://doi.org/10.1016/j.eneco.2021.105510

7) Graskemper V., X. Yu and Jan-Henning Feil (2021). Farmer Typology and Implications for Policy Design #8211 an Unsupervised Machine Learning Approach. Land Use Policy. Volume 103, April 2021, 105328.

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[Study outside of class (preparation and review)]

Practice with R (or Python)

（Other information (office hours, etc.)）

For updated information about the course, please check the website of the Division of Natural Resource Economics at:
http://www.reseco.kais.kyoto-u.ac.jp/en/

*Please visit KULASIS to find out about office hours.