III COURSE ON MACHINE LEARNING AND CENTRAL BANKING

Digital Format
September 12 - 15, 2022

Moderator: Gerardo Hernández-del-Valle, CEMLA
Speakers: Gabriela Alves Werb and Sebastian Seltmann, Deutsche Bundesbank

MONDAY
12 SEPTEMBER
2022

09:00 – 09:20 Welcome remarks
Gerardo Hernández-del-Valle, In charge of the Directorate of Financial Markets Infrastructure, CEMLA

09:20 – 10:30 Introduction I
• Structure and Organization of the Course
• Train, Test and Validation Samples
• Cross-Validation

10:45 – 12:15 Introduction II
• Confusion Matrix
• Evaluation Measures (Precision, Recall, F1-Score, etc.)
• PR Curve

10:30 – 10:45 Break

TUESDAY
13 SEPTEMBER
2022

08:30 – 09:00 Q&A

09:00 – 10:30 Tree-Based Methods
• Decision Trees (CART)
• Conditional Inference Trees

10:30 – 10:45 Break

10:45 – 12:15 Introduction to Ensemble Methods
• Bagging
• Boosting
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### WEDNESDAY 14 SEPTEMBER 2022

- **08:30 – 09:00**  | Q&A
- **09:00 – 10:30**  | **Ensemble Methods I**  
  - Random Forest  
  - Causal Random Forest  
- **10:30 – 10:45**  | Break  
- **10:45 – 12:15**  | **Ensemble Methods II**  
  - Gradient Boosting

### THURSDAY 15 SEPTEMBER 2022

- **08:30 – 09:00**  | Q&A
- **09:00 – 10:30**  | **Support Vector Machines**  
  - Support Vector Machines  
- **10:30 – 10:45**  | Break  
- **10:45 – 12:00**  | **Machine Learning Use Cases in Central Banking**  
  - Showcase of Current Applications  
  - Open Discussion with Participants  
- **12:00 – 12:15**  | Wrap-Up  
  Gabriela Alves Werb and Sebastian Seltmann, *Deutsche Bundesbank*
- **12:15 – 12:30**  | Closing Remarks  
  Gerardo Hernández-del-Valle, *CEMLA*
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OPTIONAL READINGS

For a comprehensive introduction to R, we recommend participants to take the online tutorial "Introduction to R" from Datacamp.