Course Introduction

What (and how) are we going to learn?

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Table of Contents

Course Objectives

Teaching computers
how to do stuff

Course Objectives

- Learn the basics of how data modelling works
- Learn what machine learning is and how it helps make decisions, automate tasks, etc.
  - Apply mathematical intuition
- Learn what the basic algorithms are and how they work
- Apply machine learning to real data to get insights
- Do at least one complete project
  - Data preparation
  - Choosing algorithms
  - Model training, improvement, and selection
  - Presenting a complete solution
    - Communicating results and ensuring reproducibility

Prerequisites

Programming Basics

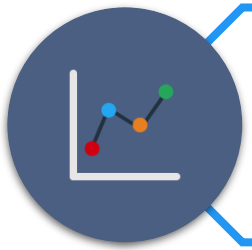
- Familiarity with Python is required
- Software development experience is a plus

Math Concepts

- Know some algebra, statistics, and calculus
- Have basic logic and intuition

Intermediate English

- Understand what is written on the slides



Scientific Mindset

- Know how to work with data
- Be open to (and not afraid of) challenges

Course Format Details

Curriculum, schedule, trainer, lecture format, exam

Curriculum

- Introduction to machine learning
- Linear and logistic regression
- Model training and improvement
- Tree and ensemble models
- Support vector machines
- Clustering
- Dimensionality reduction
- Introduction to neural networks
- Time Series
- Exam preparation: end-to-end project
- ML Q&A: machine learning in the wild

Course Schedule

- Lessons
  - 10 lectures x 4 hours each
- Homework
  - Quiz: 0,25-0,5 hours
    - Questions to check your understanding
  - Paper summary: 2-10 hours
    - Learn to read, understand, and reproduce scientific information
- Extracurricular activities: 0+ hours
  - The more – the better :)
- Practical exam
  - Preparation at home – 10-40+ hours
  - On-site defense: 10 minutes

Time Allocation

- Course
  - 7 September – 16 November 2023
- Exam
  - **Group 1:** 26 November 2023, 09:00-18:00, GMT+2
  - **Group 2:** 3 December 2023, 09:00-18:00, GMT+2
- Retake exam
  - 10 December 2023, 09:00-18:00, GMT+2

Final Exam

- Quiz (theoretical exam)
  - 10 questions for 30 minutes
- Practical project
  - Work on your own
    - No teams allowed
  - Present your results (documentation, code, models, Web services, etc.) in a limited amount of time
- Work on a given assignment
  - Perform research
    - Scientific papers, community forums, etc.
  - Analyze the data
  - Train one or more machine learning algorithms
    - Select and improve models
    - Document all your findings
  - Communicate the results
  - Optionally… do whatever you like :D

Grading Scheme

- Quizzes: up to 10%
  - Due date: at the end of the course
- Paper summary: up to 10%
  - Due date: at the end of the course
  - Submit along with the final exam
    - Don't submit anything else for the retake
- Final exam: up to 80%
  - Theoretical exam (quiz): 30% (24% of total grade)
  - Practical exam (project): 70% (56% of total grade)
  - Develop at your own pace
  - **Upload deadline:** Friday before the exam date; 12:00 PM GMT+2
  - Project defense
- Discord / Facebook group activity: bonus up to 10%
- Other bonuses: up to 10%

Grading and Course Certificates

- All students will be graded on a scale from 2,00 to 6,00
  - The same way the standard grading in Bulgaria works
- Everyone who scores ≥ 5,00 (total) will get a certificate from SoftUni
- Everyone who scores ≥ 3,00 (on both theory and practice) can get a MoES certificate as well
  - You need to apply explicitly within a limited time

Why bother?

- Starting point for a **new career**
  or **continuing education** in your current field
- **Career assistance**
  - The SoftUni career center will help you find work
- Official and recognizable
  - Employers value certificates
- Proof of hard work :)
  - Shareable and verifiable

- We make sure that everyone who scores $\geq 5{,}00$
  knows what they're doing :)

STRENGTH +0 (11)

DEXTERITY +2 (14)

CONSTITUTION +2 (15)

INTELLIGENCE +6 (22)

WISDOM +4 (18)

CHARISMA +3 (16)

DUNGEONS & DRAGONS®

Yordan Darakchiev
CHARACTER NAME

Trainer CLASS	Researcher BACKGROUND
Human RACE	Lawful Good ALIGNMENT

FEATURES & TRAITS

- Programmer
  - .NET / full-stack Web developer
- Machine learning engineer
  - Multiple projects, mainly image processing
- Trainer
  - Various programming courses
  - Scientific (and popular) lectures
- Scientist / Enthusiast
  - BSc & MSc in Astrophysics
  - Currently pursuing a PhD

PROFICIENCIES & LANGUAGES

- Machine learning
- Research
- Teaching
- Software engineering
- Python
- C#
- JavaScript

Learning Resources

Learn more
and share your knowledge

SoftUni Resources

- AI module page
- Official Web page of this course
- Facebook group
- Discord server
- Guidelines
  - Ask and answer questions
    - I will try to answer your questions as well
  - Post what you've learned
    - Links to resources, code snippets, ideas, tips and tricks
  - Share your problems (homework or not) and help solve them
  - Create and maintain a community

Online Resources

- Books
  - "How not to be wrong" – Jordan Ellenberg
  - "The Elements of Statistical Learning" – Stanford (free PDF)
  - Some parts of Deep Learning – Ian Goodfellow (free PDF)
  - … and anything else you can find
- Websites
  - Khan Academy
  - Communities: Kaggle, Quora, Stack Exchange
  - Online courses: Coursera, edX, MIT OCW, Stanford, etc.
- YouTube
  - AsapSCIENCE, Veritasium, Vsauce, TedEd, Daniel Shiffman, CrashCourse, Numberphile, Computerphile, Vi Hart, 3Blue1Brown, blackpenredpen, Mathologer, and many more

Questions?