MC886/MO444A - Machine Learning
Institute of Computing - Unicamp
First Semester 2021

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http://www.ic.unicamp.br/~esther/teaching/2021s1/m0444

Course Information - Syllabus

1 Summary

The course will be conducted through online tools. We will adopt Google Classroom (https://classroom.google.com) as our main tool. To get access to Google Classroom, students must use their DAC accounts. Invites to the course page with access codes will be sent to your e-mails.

Credits:	4
Class hours:	The discipline will happen synchronously in the class scheduled time. Attendance is not required but is encouraged
Website:	https://classroom.google.com and http://www.ic.unicamp.br/~esther/teaching/2021s1/mo444
Support to students:	The support will happen through virtual channels scheduled with the professor and class assistants
Course Goals:	By the end of the course, students must understand, implement and critically analyze the state of art theories, laws, and techniques that can lead machines to improve their performance in tasks based on their experience.
Teaching assistants:	Alana Correia (Ph.d Student) alana.correia@ic.unicamp.br Patrick Ferreira (M.Sc Student) patrickctrf@gmail.com

Every Monday	21:00-23:00h	Course online meeting
Every Wednesday	19:00-21:00h	Course online meeting

2 Syllabus

Topics to be presented in the course include:

Introduction to Machine Learning • Supervised Learning • Unsupervised Learning • Reinforcement Learning • Linear Regression • Logistic Regression • Neural Networks • PCA and LDA • K-means • Deep Learning • SVM • Decision Trees, Random Forest and Ensemble Learning

3 Programming languages

We will use Python as the course reference programming language.

4 Course Page and Activity Submission

The course material will be available on the course page `http://www.ic.unicamp.br/~esther/teaching/2021s1/mo444` and in the Google Classroom. Practical work and projects carried out during the course must be submitted through Google Classroom in the area corresponding to the course.

5 Evaluation

The evaluation of the discipline will be conducted based on the following activities:

- A set R of varied tasks that will have grades distributed proportionally. Tasks include readings, reviews of recommended articles and online tests:
  - $R = \frac{R_1+R_2+...+R_n}{n}$, where n is the number of activities carried out throughout the semester
- Three projects, $P1$, $P2$ and $P2$ with weights 15%, 20% and 15%, respectively
  - Groups must have 2 students
  - The code and the reports must be delivered via Google Classroom
- A final project PF with weight 40%
  - Groups must have 4 students
  - The student will only be able to submit the final project if he/she has delivered the three projects $P1$, $P2$, and $P3$.
  - The code and the report must be delivered via Google Classroom, and the report must present an explanation of the technique implemented, illustrations of the results, and a discussion of the results obtained in the format of a scientific article, in the formar suggested by the teacher.
  - The project must be presented (in a 5-minute video format), by the group, on the scheduled date.
- The final grade, MF, will be calculated as: $MF = 0.10R + 0.15P1 + 0.20P2 + 0.15P3 + 0.40P4$
- The student will be approved if his final grade is $MF \geq 5.0$ Otherwise, he/she will fail.
- For graduate students, the grade range will be:
  - A: >=8.5
  - B: >=7.0 and <8.5
  - C: >=5 e <7.0
  - D: <5

5.1 Deadlines

- Project 1 ($P1$): 07/04/2021
- Project 2 ($P2$): 05/05/2021
- Project 3 ($P3$): 07/06/2021
- Final project: 04/07/2021

6 Bibliography

Some of the references considered important for the fulfillment of the proposed content are listed below. The complementary material to be used will be indicated on the course page.

1. ALPAYDIN, E. Introduction to Machine Learning: adaptive computation and machine learning, 3rd edition. MIT Press, 2014.
2. MARSLAND, S. Machine Learning: An Algorithmic Perspective, 2nd edition. CRC Press, 2015.
3. GOODFELLOW, I.; BENGIO, Y.; COURVILLE, A. Deep Learning. MIT Press. Online book. Available at: http://www.deeplearningbook.org. 2016.
4. RASCHKA, S. Python Machine Learning. Packt publishing, 2015.
5. BISHOP, C. M. Pattern Recognition and Machine Learning. Springer. Cambridge, 2007.
6. HAYKIN, S. Neural networks and learning machines, 3rd edition. Prentice Hall, 2009.
7. MITCHELL, T. Machine learning. McGraw-Hill. Massachusetts, 1997.
8. GERON, A. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, 2019.

9. SUTTON, R.; BARTO, A. Reinforcement Learning: An Introduction, 2nd Edition. This is available for free in http://incompleteideas.net/book/RLbook2018.pdf.
10. RUSSELL, S.; NORVING, P. Artificial Intelligence: A Modern Approach, 2020.

Observations

- There will be no substitute projects.
- This discipline has no final exam.
- **Any fraud attempt on the projects will result in a final score of $MF = 0$ (zero) for all involved.**