MACHINE LEARNING

INTRO

Introduction

"What is this course really about"

- Broad introduction to machine learning: general category of algorithms that **learn through data and experience**
- **Deep supervised**, **unsupervised** and **reinforcement learning**.
    - Focusses exclusively on deep learning: machine learning using neural networks.
- **Different architectures**: fully connected feed forward nets, encoders and decoders, recurrent and recursive neural nets, convolution, and generative adversarial nets (GANs).
- The last part of the course will be an introduction to **reinforcement learning**.

Course Syllabus (ambitious but possible)

Part I Introduction to computational graphs

- Tensors, gradients
- Neural net building blocks
- Loss functions and optimizers

Part II Deep learning

- Fully connected nets
- Encoders and decoders
- Computer vision and convolutional neural nets
- Sequential data processing: recurrent and recursive neural nets
- Generative networks

Part III Introduction to reinforcement leaning

- Markov decision processes
- Policies, value functions and the Bellman equation
- Deep Q learning

How companies are hiring

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Course requirements

- Statistics and Probability
- Algorithms
- Programming (Python I and II)
- Algebra (particularly Linear Algebra, particularly Matrices)
- Data Mining

Class Flow

Return

- `return` statement to return a value (or values) to the calling code
- function with terminate
- Return value can be used at the point that the function was invoked

```
def square(n: int) -> int:
    return n * n

# Store result from square in a variable
result = square(4)
print(result)


# Send the result from square immediately to another function
print(square(5))
# Use the result returned form square in a conditional
expression
if square(3) < 15:
    print('Still less than 15')
```

- Theory + Code (from class repository)
- In class group work
- In class individual work

Creación de un repositorio

Crear y usar un repositorio en gitlab, compartiendo con el compañero

- Creación del repositorio
- Clonación a un directorio local
- Crear ficheros, Push
- Recibir ficheros editados por el compañero, Pull
- Avanzado: crear una rama (branch), editar, y merge
- avanzado ii: edición simultánea de ficheros por los dos, merge

Sorting nested data structures

Consider a nested data structure (container):

```
student_tuples = [
    ('john', 'A', 15),
    ('jane', 'B', 12),
    ('dave', 'B', 10),
]
```

We want to sort this structure. After sorting, we will return tuples of str, str, int, the elements of the list.

The question is:

- What criteria are we going to use to sort?

Expectations

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Come to class, learning on your own is possible but harder (I hope!)

Regular work, keep up with the assignments

Plenty of information in internet, but practice makes prefect (not just understand, but be able to do)

Evaluation items

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Evaluation items:

- Written exam covering theory and practice (50% of final grade)
- In class activities and quizzes (15%)
- Assignments (individual work based on case): 30% of the final grade
- Participation (5%)

For students unable to attend classes (Erasmus, etc) or students repeating this course, grading will be done as follows:

- same evaluation system except participation. 5% of class participation may be obtained by attending at least three tutorials with the teacher responsible for the course.
- In class activities and quizzes have to be done in Canvas 1 week after being posted.

Please contact the professor if you are in this group.

Evaluation items

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Criteria to pass:

- Obtain at least a 5 in the written exam
- Obtain an average of at least of 5 in the class assignments + class activities.
- Assignments will have a due date. Students can submit late **after this due date** and up one week after the due date, but the grade of the late assignments will be reduced **daily by 5% as a penalty**, up to a maximum of 35%. No submissions **will be allowed after 1 week**.
- Presenting all assignments and class quizzes is not a requirement, but **the grade of a missed assignment will be zero and will be averaged with the rest of the submissions**.

Books

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Important: Change from Syllabus!

Deep Learning with PyTorch by Eli Stevens, Luca Antiga, and Thomas Viehmann, Manning Publications (2020)

Support:

- **PyTorch Deep Learning Hands-On_** Build CNNs, RNNs, GANs, reinforcement learning, and more, quickly and easily by Thomas, S. First Edition. Packt Publishing (2019).

Questions

In this order:

- Book
- Internet (https://stackoverflow.com/, https://stackexchange.com)
- Forums (Canvas)
- Videos (on demand), tutoring (online). Email me!

Individual assignments

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Trabajos individuales, “colaboración permitida”

- Puedes discutir ideas con los compañeros
- El trabajo remitido tiene que ser individual, escrito por ti mismo

Trabajos individuales, “colaboración NO permitida”

- El trabajo remitido sólo puede ser discutido de manera individual con el profesor

En ningún caso se puede compartir código entre compañeros.

Plagiarism

Cualquier tipo de fraude o plagio por parte del alumno en una actividad evaluable será **sancionado** e implicará un 0 en la calificación de esa parte de la asignatura, **anulando la convocatoria en curso.**

La situación, además, será comunicada a la Dirección de la Carrera, que a su vez comunicará a Secretaria General, siguiendo el protocolo establecido en la universidad.

Esto incluye código

OS LO RUEGO…

Questions and Answers

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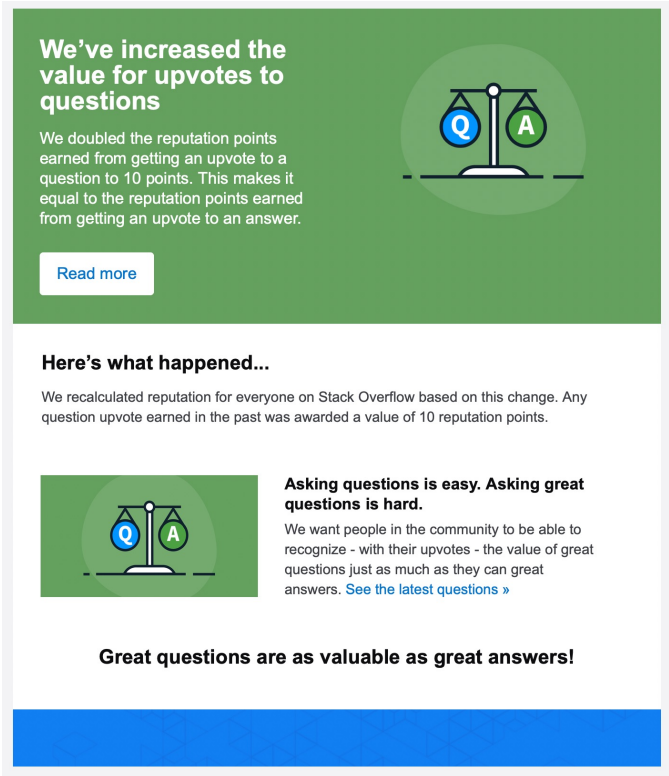
stackoverflow

Stack Overflow is an [open community] for anyone that codes:

- Public Q&A
- Private Q&A (engine, for co-workers)



Questions about the coure?

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