machine learning

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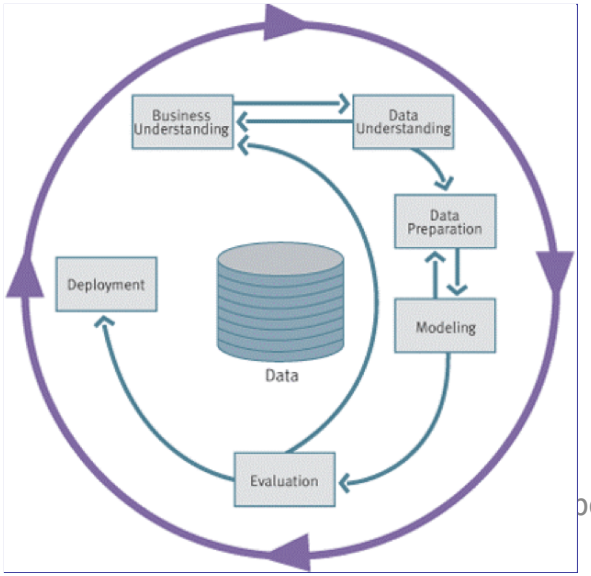
introduction to the course

- assumptions
- goals
- plan
- evaluation
- team
- support
- software
- bibliography

we assume superficial knowledge on (from AI course)

- develop simple predictive data mining projects involving the most traditional tasks
  - classification
  - regression



- namely
  - identify problems that can be addressed with predictive DM
  - follow proper methodology to solve DM problems
    - simple
  - evaluate results
    - technical perspective
    - ... and application domain

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so, our goals are

(well, your goals, really…)

- consolidate/complete basic skills in DM
  - predictive tasks
  - descriptive tasks
  - project development
- acquire (some) advanced skills in ML/DM
  - including on research topics of the lecturers

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plan

week	date T lesson	T lecturer	T session	TP session
1	21/10/2021	CS	Introduction to course. Data mining methodologies. (DM project) introduction	-
2	28/10/2021	CS	Classification: introduction, decision trees & evaluation. Scoring with classification model: approach & evaluation	(DM project) suggested goal: dataset(s) based on a single table; 1st kaggle submission;
3	4/11/2021	RR	DM projects: data preparation. Data preparation methods (basic). Data preparation in R	(DM project) suggested goal: datasets based on multiple tables with engineered features
4	11/11/2021	RR	DM projects: data understanding (quality & visualization). Data visualization in R	(DM project) suggested goal: data understanding
5	18/11/2021	CS	Advanced issues in data preparation and modeling (feature selection, dimensionality reduction, imbalanced class distribution)	(DM project) suggested goal: application of methods for class imbalance
6	25/11/2021	CS	Regression. Learning algorithms and ensembles	(DM project) suggested goal: final submission; analysis of models obtained with different algorithms
7	2/12/2021	RR	Clustering	(DM project) suggested goal: customer profiling
8	9/12/2021	RR	Frequent pattern mining	
9	16/12/2021	CS	Recommender Systems	(DM project) close project
-	23/12/2021			
-	30/12/2021			
10	6/1/2022	RR	Anomaly detection	hands-on (FPM + RS)
11	13/1/2022	RR	Neural Networks & Deep Learning	hands-on (AD)
12	20/1/2022	CS	AutoML & Metalearning	hands-on (NN & DeepL)
13	27/1/2022	CS	Seminar	hands-on (autoML & metalearning)

evaluation: test

- model available in moodle
  - sometime soon...
- grade
  - 50% of final grade
  - minimum grade of 7/20

evaluation: competition (1/2)

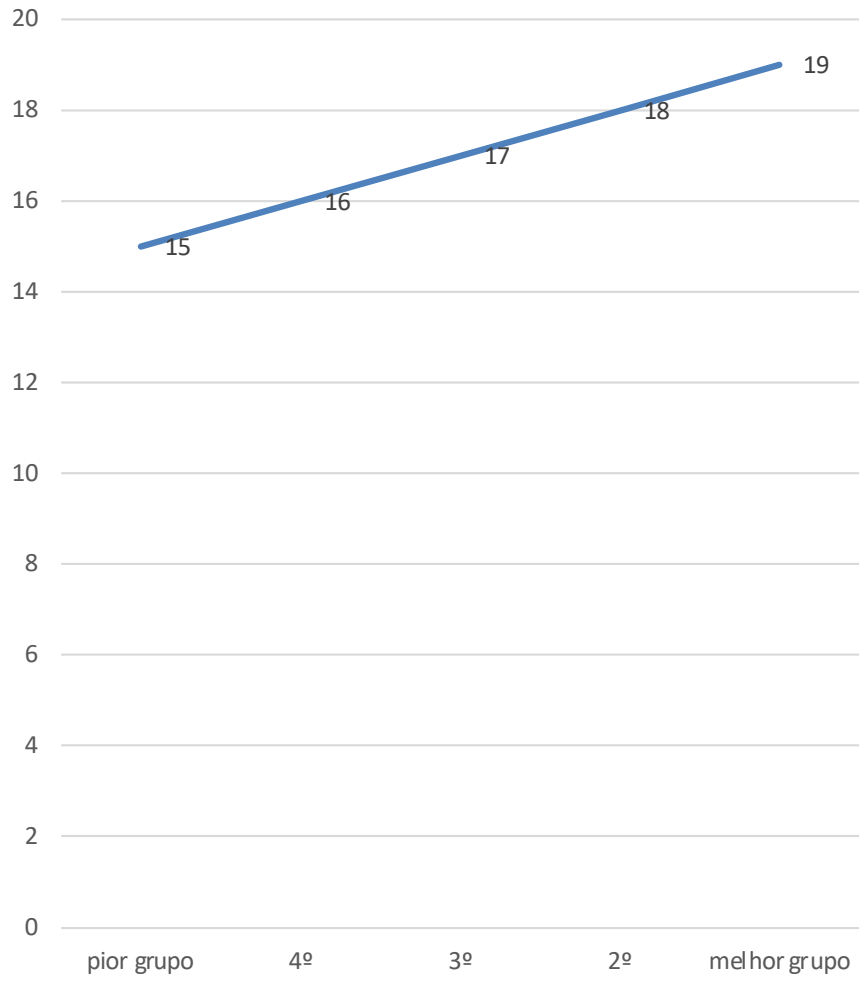
- goal
  - predict if a loan will be paid or not
- data
  - bank loans
- groups of 3
- grade
  - (60% SA + 20% CS + 20% P) * IF
    - submitted assignment
    - competition score
    - presentation
    - individual factor
  - 50% of final grade
  - minimum grade of 7/20

evaluation: competition (2/2)

CS_i = min_j(SA_j) + CompetitionRank_i*

(max_j(SA_j) - min_j(SA_j) / #groups

– ex.
  - best is max_j(SA_j)=19
  - worst is min_j(SA_j)=16



yes, there's a meme for it

team

Rita Ribeiro

- assistant professor @ FCUP
- director MDS (FCUP)
- researcher @ INESC TEC

Carlos Soares

- associate professor @ FEUP
- external advisor for IS @ Fraunhofer AICOS
- researcher @ LIACC & INESC TEC

João Mendes Moreira

- associate professor @ FEUP
- director MDSE (FEUP)
- researcher @ INESC TEC

Nuno Moniz

- invited assistant professor @ FEUP/FCUP
- researcher @ INESC TEC

support

- moodle
  - materials
  - evaluation
  - communication
- ... also on slack
  - https://join.slack.com/t/slack-gif7267/shared_invite/zt-xk1d2c3m-sN126Bu7fCo2GdHSYCOm2A
- mail
  - csoares@fe.up.pt
  - rpribeiro@fc.up.pt
  - jmoreira@fe.up.pt
  - nuno.m.moniz@inesctec.pt
- … with subject: “[ML@M.EIC]…"

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(concepts are more important than)

software

- programming
  - R
  - Python
- … or point & click
  - RapidMiner
    - https://rapidminer.com/
    - academic licence
      - installation instructions at http://docs.rapidminer.com/studio/installation/
      - insert the license key, according to the section "Entering the key in RapidMiner Studio" at http://docs.rapidminer.com/studio/installation/manual-license.html

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bibliography

- Moreira, J. M., de Carvalho, A. C. P. L. F., & Horváth, T. (2018). *A General Introduction to Data Analytics*. *A General Introduction to Data Analytics*. Hoboken, NJ, USA: John Wiley & Sons, Inc. https://doi.org/10.1002/9781119296294

- Data Science for Business, by Foster Provost, Tom Fawcett
  - general book, read from end to end
- Data Mining: The Textbook, by Charu C. Aggarwal.
  - textbook, to place in the shelf and consult frequently
- Data Mining: Concepts and Techniques, 3rd ed, by Jiawei Han, Micheline Kamber and Jian Pei
  - textbook, but I prefer the previous one
- The Elements of Statistical Learning: Data Mining, Inference, and Prediction (Second Edition), by Trevor Hastie, Robert Tibshirani, Jerome Friedman
  - more fundamental
- Data Mining with R: Learning with case studies, by L. Torgo
  - focused in cases