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**Barcelona
Supercomputing
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Centro Nacional de Supercomputación



XNDL - Lab 6

Classification

For each problem

- ❖ Obtain a baseline
 - SVM linear/RBF: Cost grows with num. samples
 - DT: Cost grows with num. vars
- ❖ Try to beat it with a MLP
 - Monitor complexity: `model.summary()`
- ❖ Deliver a 100 words on the lessons learnt together with the curves of your best model
- ❖ Include a table with best baseline and MLP

Classification problem

- ❖ Metrics
 - binary/categorical cross entropy
 - accuracy / precision / recall
- ❖ Output activation = num_classes + softmax
- ❖ Output prediction to One-hot -> `np.argmax(vec, axis)`

Baby steps

- ❖ Data nature & dimensionality
- ❖ Loss function & output
- ❖ Compute baseline
- ❖ Fix a batch size (stochasticity vs efficiency)
- ❖ Start small
 - Early stop (update)
 - LR
 - Act. Func. (weight init!)
 - Mom
- ❖ Grow

Datasets

- ❖ Try to beat SVMs on
 - olivetti_faces (sklearn)
 - Lots of features. Complexity vs performance
 - 20newsgroups (sklearn)
 - Lots of samples. String pre-process
 - covtype (sklearn)
 - Lost of samples.
- ❖ val split min. 20%

Tips

- ❖ Log your experiments!
- ❖ Fix seeds (np & tf)
- ❖ Plot loss & metric
- ❖ MLP input “to_categorical” (to one-hot vec.)
- ❖ model.summary: Watch number of params
- ❖ MLP outputs np.argmax (to one-hot vec.)

Recommended imports

- ❖ `import sys`
- ❖ `from keras.models import Sequential`
- ❖ `from keras.layers import Dense`
- ❖ `from keras.optimizers import SGD, Adam`
- ❖ `import numpy as np`
- ❖ `import matplotlib.pyplot as plt`
- ❖ `from sklearn.metrics import classification_report, confusion_matrix`
- ❖ `from sklearn.model_selection import train_test_split`
- ❖ `from keras.callbacks import EarlyStopping`
- ❖ `import tensorflow as tf`
- ❖ `from sklearn.svm import SVC`
- ❖ `from sklearn.tree import DecisionTreeClassifier`
- ❖ `from keras.utils import to_categorical`
- ❖ `from sklearn.feature_extraction.text import CountVectorizer`



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The end