MACHINE LEARNING

LAB1

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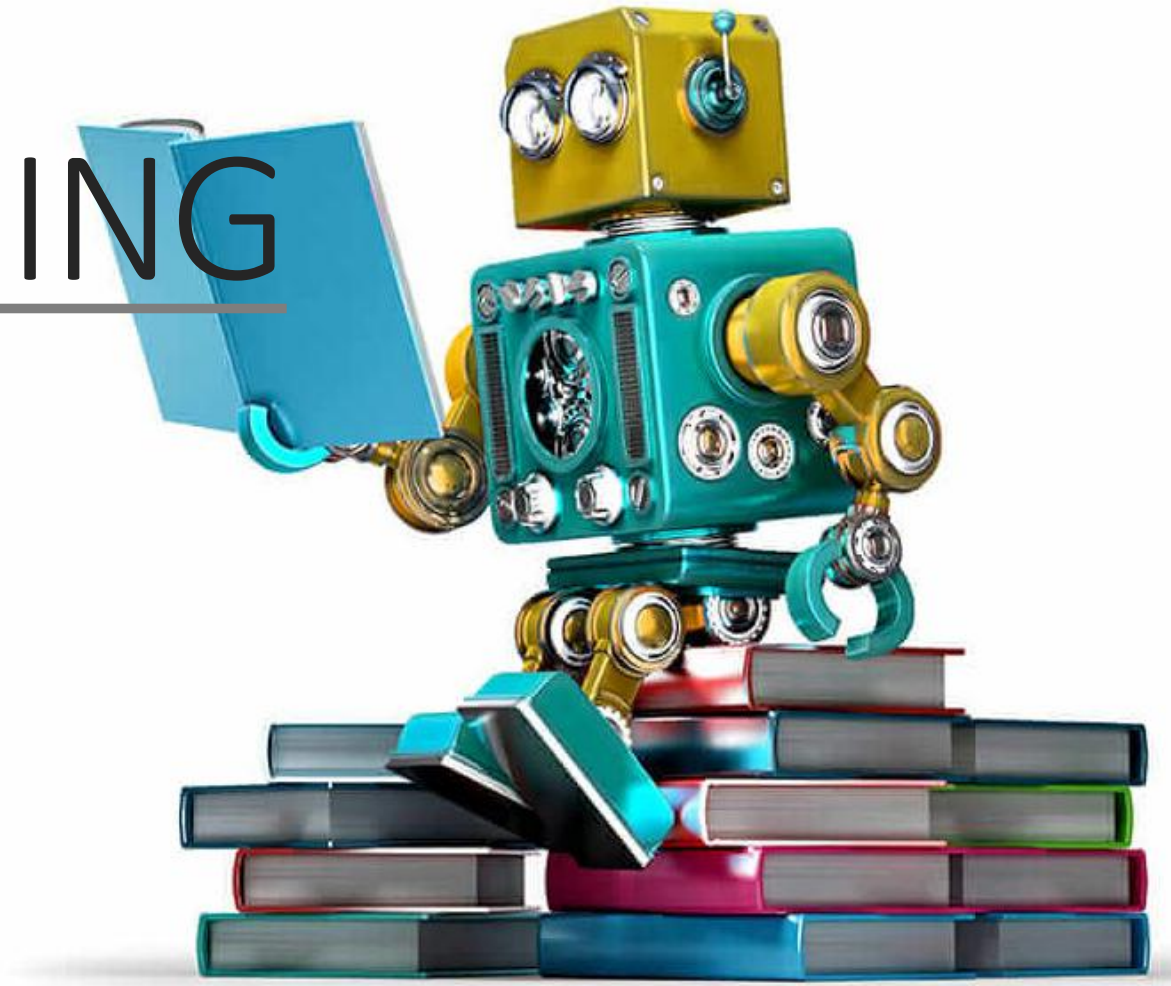


OBJECTIVES

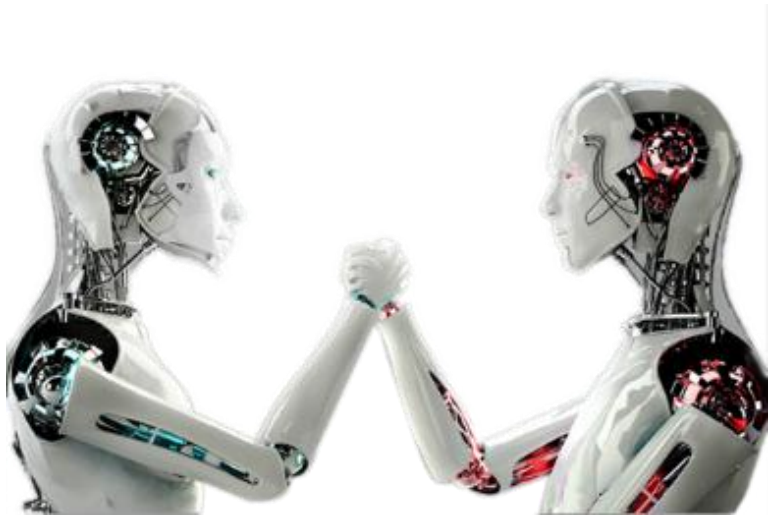
01 Lab Introduction

02 Prepare the development environment

03 Lab Task

PART ONE

Lab Introduction



Class Schedule

- Lecture : W 8:00 am -9:50 am Lychee Hills Building 1 Room 203
- Lab01: W 10:20 am -12:10 pm Lychee Hills Building 6 Room 408
- Lab02: W16:20 am -18:10 pm Lychee Hills Building 6 Room 406

- **Grading policy**

Final Exam (in-class):	20%	Midterm Exam(take-home):	10%
Assignments (8~12 times):	20%	Quizzes(<=10 times):	10%
LAB Task:	**15%**	**Final Projects (4 per group):**	**20%**
LAB attendance:	**5%**		

90~93: A-	94~97: A	98~100: A+
80~82: B-	83~86: B	87~89: B+
70~72: C-	73~76: C	77~79: C+
60~62: D-	63~66: D	67~69: D+

Please open the Shared Exel, and complete the grouping. DDL is week3.

CS405-LAB1 Project...
扫一扫二维码打开或分享给好友

CS405-LAB2 Project...
扫一扫二维码打开或分享给好友

- 腾讯文档 -
可多人实时在线编辑，权限安全可控

- 腾讯文档 -
可多人实时在线编辑，权限安全可控

Attendance

- Mandatory
- Be on Time!
- Don't expect labs to end early.
- Let instructor know if you anticipate an absence.

Textbook and Lecture Notes

Textbooks:

1 Pattern Recognition and Machine Learning, by Christopher M. Bishop, 2006 Springer

2 Machine Learning in Action, by Peter Harrington, 2012, Manning

3 Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow

Other books:

1 机器学习，周志华

2 Dive in Deep Learning, by Aston zhang, Zachary C.Lipton, Mu Li, and Alexander J.Smola

3 Reinforcement Learning: An Introduction, by Richard S. Sutton

4 the Elements of Statistical Learning Data Mining, Inference, and Prediction

Paper reading:

1 Ghahramani Z. Probabilistic machine learning and artificial intelligence, Nature, 2015

2 Lecun Y, Bengio Y, Hinton G. Deep learning, Nature, 2015

3 Littman M L. Reinforcement learning improves behavior from evaluative feedback, Nature, 2015

Lecture notes:

http://hqlab.sustc.science/teaching/CS405

BB:https://bb.sustech.edu.cn/webapps/blackboard/execute/announcement?method=search&context=course&course_id=_1805_1&handle=cp_announcements&mode=cpview

Other considerations

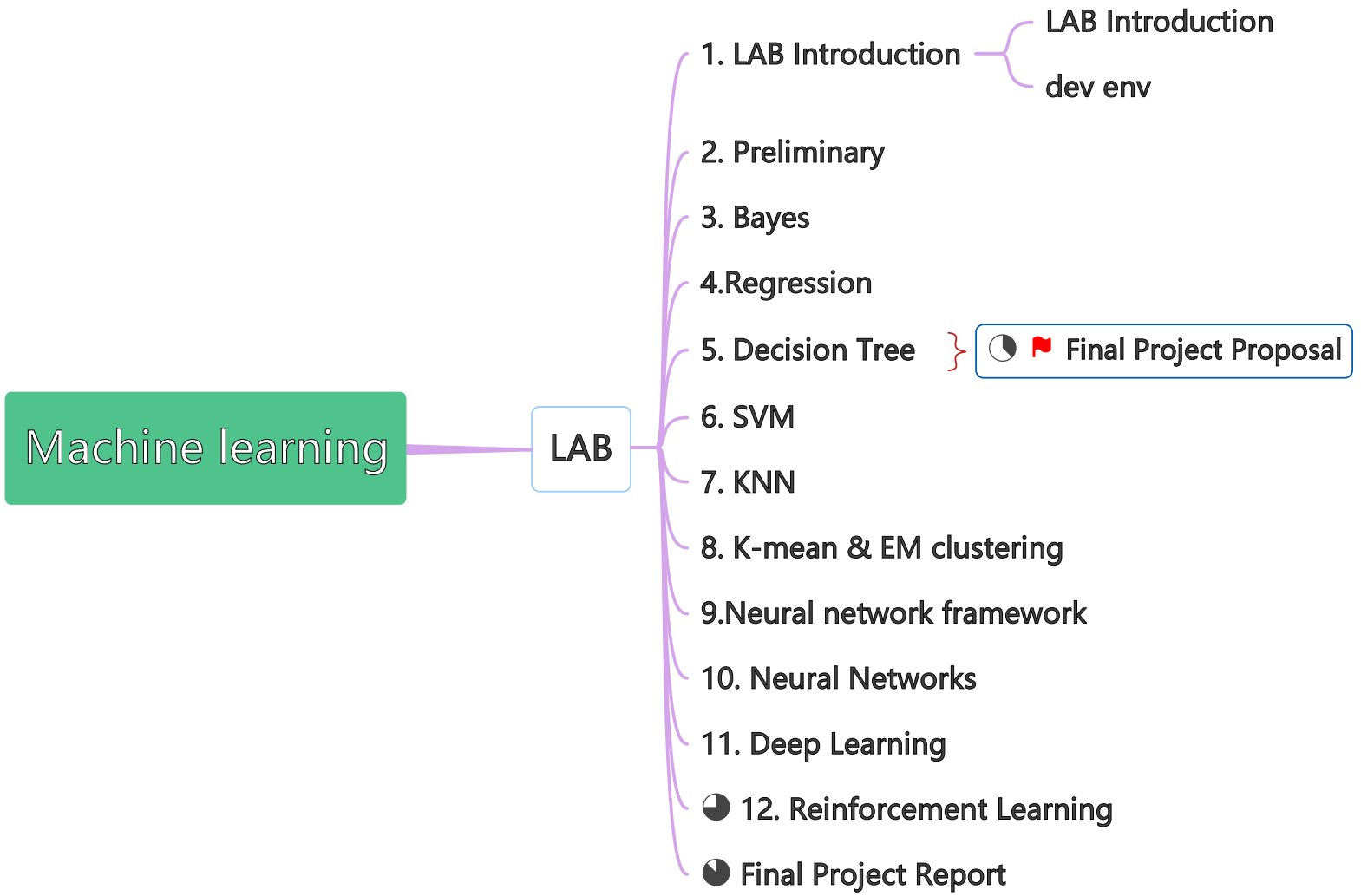
- **TA:**

LAB	TA
10:20 am -12:10 pm Lychee Hills Building 6 Room 408	郑涛、陈圣铎、徐梦雅
16:20 am -18:10 pm Lychee Hills Building 6 Room 406	

- **Communication platform**

群名称:机器学习2020
群　号:1132148103

Lab Schedule



Final Projects

Machine Learning

1 Reinforcement learning based planning using a self-driving car simulator

2 Generation of annotated self-driving datasets with the CARLA simulator

3 Segmentation of 2D/3D measurements for self-driving applications

4 Detection and recognition of traffic signs for self-driving applications

5 Detection and tracking of 2D/3D objects for self-driving applications

Lab Report & Grading Guidelines

- Lab report
  - ✓ Follow the lab instructions
  - ✓ Testing the algorithms and discuss your observations [25%]
  - ✓ Develop new algorithms (bonus)
  - ✓ Describe your methods (bonus)
  - ✓ Validating the algorithms and discuss your observations[75%]

we will deduct scores according to this rule, but we will not strictly follow it all the time. In some cases, we may decide to detract more or less points based on the perceived gravity of the mistakes.

Final Project & Grading Guidelines

Machine Learning

- Proposal (with Presentation) (2~4 people) [20%]
- Midterm report [10%]
- Final Report(with Presentation and Demos [70%]

- Abstract (motivation, method, novelties, validation) [10%]
- Introduction (Background, Motivation, Challenges, Rationale, Contributions) [15%]
- Existing Methods of Related Work, Novelties of This Work [15%]
- System Setup, Problem Statement [10%]
- Proposed Method [15%]
- Results (Experiment platform, experiment setup, results) [10%]
- Discussion (Comparison and analysis, speed, accuracy, robustness, strengths and limits) [15%]
- Conclusion (Main method, major results, future work) [05%]
- References [05%]

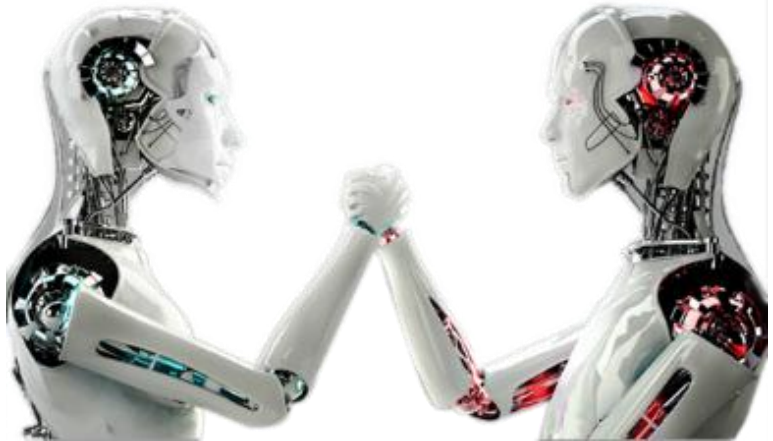
we will deduct scores according to this rule, but we will not strictly follow it all the time. In some cases, we may decide to detract more or less points based on the perceived gravity of the mistakes.

Websites

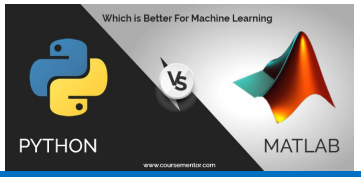
- **Lab Tutotial web sites**
  - *http://scikit-learn.org/stable/tutorial/basic/tutorial.html*
  - *https://pythonprogramming.net/python-fundamental-tutorials/*
  - *https://pythonprogramming.net/data-analysis-tutorials/*
  - *https://pythonprogramming.net/robotics-tutorials/*
  - http://prml.github.io/

PART TWO

Prepare the development environmentIntroduction



Prepare the development env intro

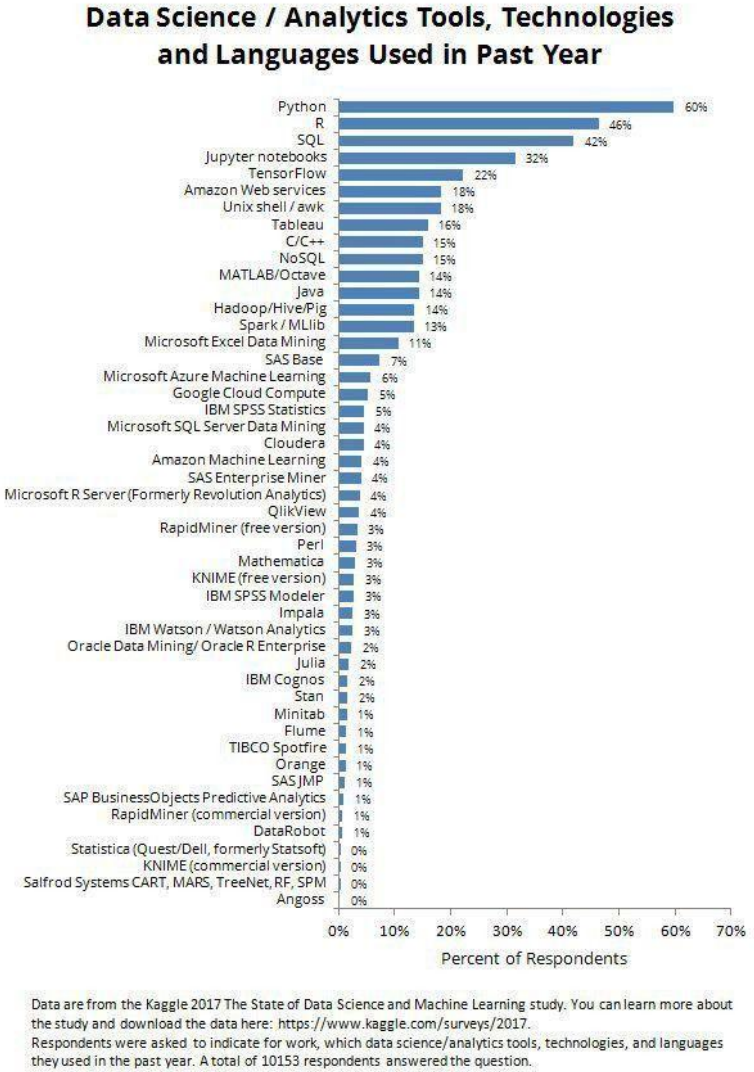


Machine Learning

Matlab VS python: which is Better for machine learning?

	MATLAB	Python
Neural Networks	✓	✓
Random Forest	✓	✓
SVM	✓	✓
Other Machine Learning Libraries	Toolboxes (commercial + open source)	Scikit-learn and many more
Data Visualisation	I wasn't good at it anyway ...	Matplotlib (plus a lot more since then)

If we compare Python vs MATLAB machine learning ability, then Python gets the slight edge over MATLAB. There are lots of packages in Python which are efficient in developing machine learning programs. The programmers prefer Python for machine learning.
On the other hand, MATLAB has limited features for machine learning.
By the way MATLAB is the most powerful programming language for image processing.



BUSINESS BROADWAY

Prepare the development env intro

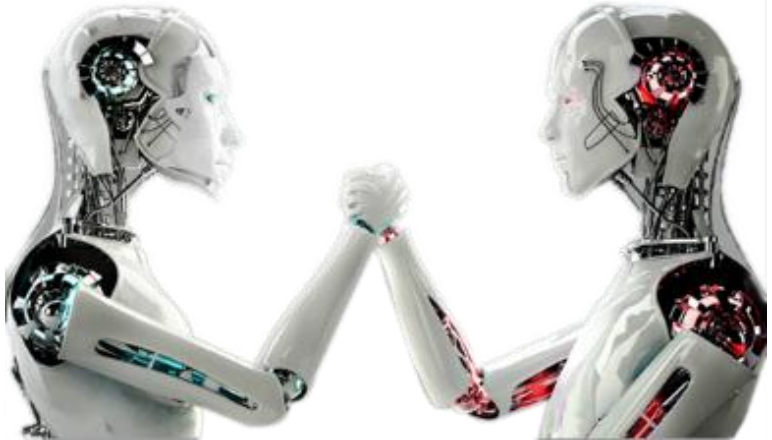
Machine Learning

1. **Install python + vscode**
   - Getting Started with Python in VS Code_20200903.pdf
2. **Install Jupyter Notebook**
   - Working with Jupyter Notebooks in Visual Studio Code_20200903.pdf
3. **Install essential libraries for Machine Learning in Python**
   - **Numpy,** a package with support for mathematical operations on multidimensional data—was the most imported package, used in nearly three-quarters of machine learning and data science projects.（https://numpy.org/）
   - **scipy,** a package for scientific computation.（https://www.scipy.org/）
   - **pandas,** a very popular library,it can easily fetch data from different sources like SQL databases, CSV, Excel, JSON files and manipulate the data to perform operations on it. （https://pandas.pydata.org/）
   - **matplotlib,** a visualization library.（https://matplotlib.org/）
   - **scikit-learn ,**Scikit-learn is one the most popular ML libraries. It supports many supervised and unsupervised learning algorithms. Examples include linear and logistic regressions, decision trees, clustering, k-means and so on.For a novice in ML, Scikit-learn is a more-than-sufficient tool to work with, until you start implementing more complex algorithms.（https://scikit-learn.org/stable/index.html）

For how to install these libraries, please refer to <Getting Started with Python in VS Code_20200903.pdf>

PART FOUR

Lab Task



Lab Task

Machine Learning

1. Install and configure your development environment on your own computer.

2. Implement more than one methods use the Scikit-learn Toolbox.
   - Parameter regularization method: Lasso(L1 norm)/Ridge(L2 norm) （https://scikit-learn.org/stable/modules/generated/sklearn.preprocessing.Normalizer.html#sklearn.preprocessing.Normalizer）
   - Linear Models: LDA (Linear Discriminant Analysis), SVM, Perceptron（https://scikit-learn.org/stable/modules/linear_model.html）
   - Nonlinear Models: KNN(Nearest Neighbors), Decision Trees, Ensemble methods, Kernel SVM, Multi-layer Perceptron

Thanks

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