Machine Learning

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Contents

Objectives

- understand and explain basic concepts of machine learning
- understand formalized concepts and methods
- be able to implement concepts and methods in the form of algorithms
- be able to sensibly select, adapt, and apply relevant methods
- be able to educate oneself

Related Fields

1. Statistics [paradigms, models]
2. Mathematics

3. Artificial Intelligence [methods, algorithms]
4. Heuristic Search
5. Information Retrieval
6. Knowledge Processing
7. Natural Language Processing

8. Decision Support Systems [applications]
9. Medical Systems
10. Search Engines
11. Self-driving cars
12. Writing Support Systems

Literature

Machine Learning:

- T. Mitchell.
  Machine Learning
  1st edition, McGraw-Hill, 1997.
  www.cs.cmu.edu/∼tom/mlbook.html

- C.M. Bishop. [Interview 2018 @ MS Research]
  Pattern Recognition and Machine Learning
  2nd edition, Springer 2006.
  www.microsoft.com/en-us/research/people/cmbishop/prml-book/

- T. Hastie, R. Tibshirani, J. Friedman.
  The Elements of Statistical Learning
  2nd edition, Springer, 2009.
  statweb.stanford.edu/∼hastie/ElemStatLearn/ (2017)

- I. Goodfellow, Y. Bengio, A. Courville.
  Deep Learning
  MIT Press, 2016.
  deeplearningbook.org

Literature

Machine Learning: (continued)

- N. Cristianini, J. Shawe-Taylor.
  An Introduction to Support Vector Machines and Other Kernel-based Learning Methods
  Cambridge University Press, 2000.

- L. Breiman, J.H. Friedman, R.A. Olshen, C.J. Stone.
  Classification and Regression Trees
  CRC Press reprint, 1998.

- V. Vapnik.
  The Nature of Statistical Learning Theory
  2nd edition, Springer 2000.

Software

Programming:

- The Jupyter Project.
  JupyterHub
  Version 3.0.
  jupyter.org

- Microsoft Corporation.
  Visual Studio Code
  Version 1.71.
  code.visualstudio.com

- JetBrains, Inc.
  PyCharm IDE
  Version 2022.2.2.
  www.jetbrains.com/pycharm

Software

Machine Learning:

- *NumPy*
  Version 1.23.
  numpy.org

- *scikit-learn: Machine Learning in Python*
  Version 1.1.
  scikit-learn.org

Software

Statistics:

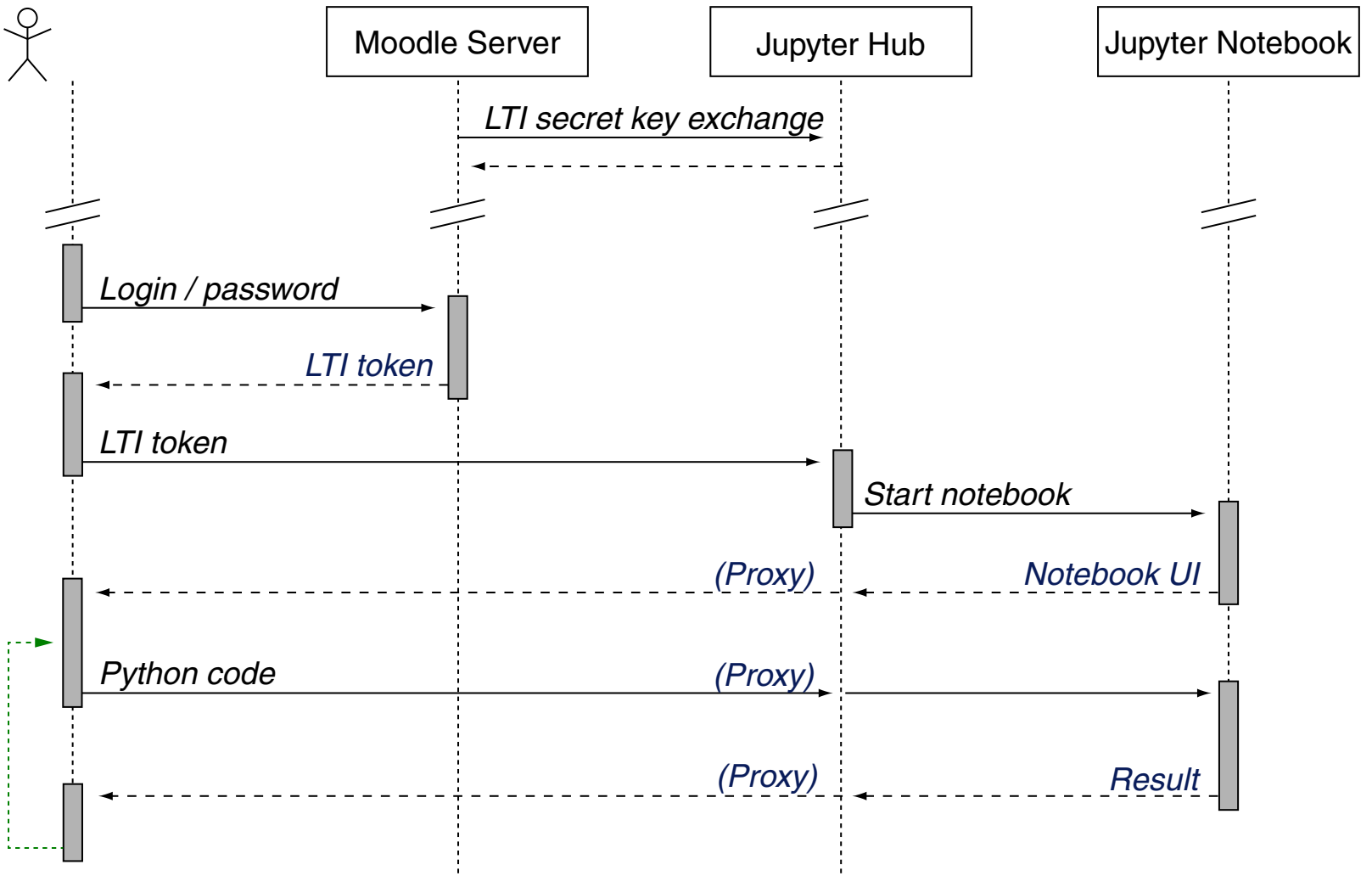
- R Development Core Team.
  R
  Version 4.2.
  www.r-project.org

- E. Jones, T. Oliphant, P. Peterson and others.
  SciPy
  Version 1.9.
  www.scipy.org

- J. W. Eaton.
  GNU Octave
  Version 7.2.
  www.gnu.org/software/octave

Software

Lab Class Setup



Software

Lab Class Setup (continued)