

# Machine Learning

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# 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](http://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/](http://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/](http://statweb.stanford.edu/~hastie/ElemStatLearn/) (2017)
  
- ❑ I. Goodfellow, Y. Bengio, A. Courville.  
*Deep Learning*  
MIT Press, 2016.  
[deeplearningbook.org](http://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](https://jupyter.org)
  
- ❑ Microsoft Corporation.  
*Visual Studio Code*  
Version 1.71.  
[code.visualstudio.com](https://code.visualstudio.com)
  
- ❑ JetBrains, Inc.  
*PyCharm IDE*  
Version 2022.2.2.  
[www.jetbrains.com/pycharm](https://www.jetbrains.com/pycharm)

# Software

## Machine Learning:

- ❑ *NumPy*  
Version 1.23.  
[numpy.org](https://numpy.org)
- ❑ *scikit-learn: Machine Learning in Python*  
Version 1.1.  
[scikit-learn.org](https://scikit-learn.org)



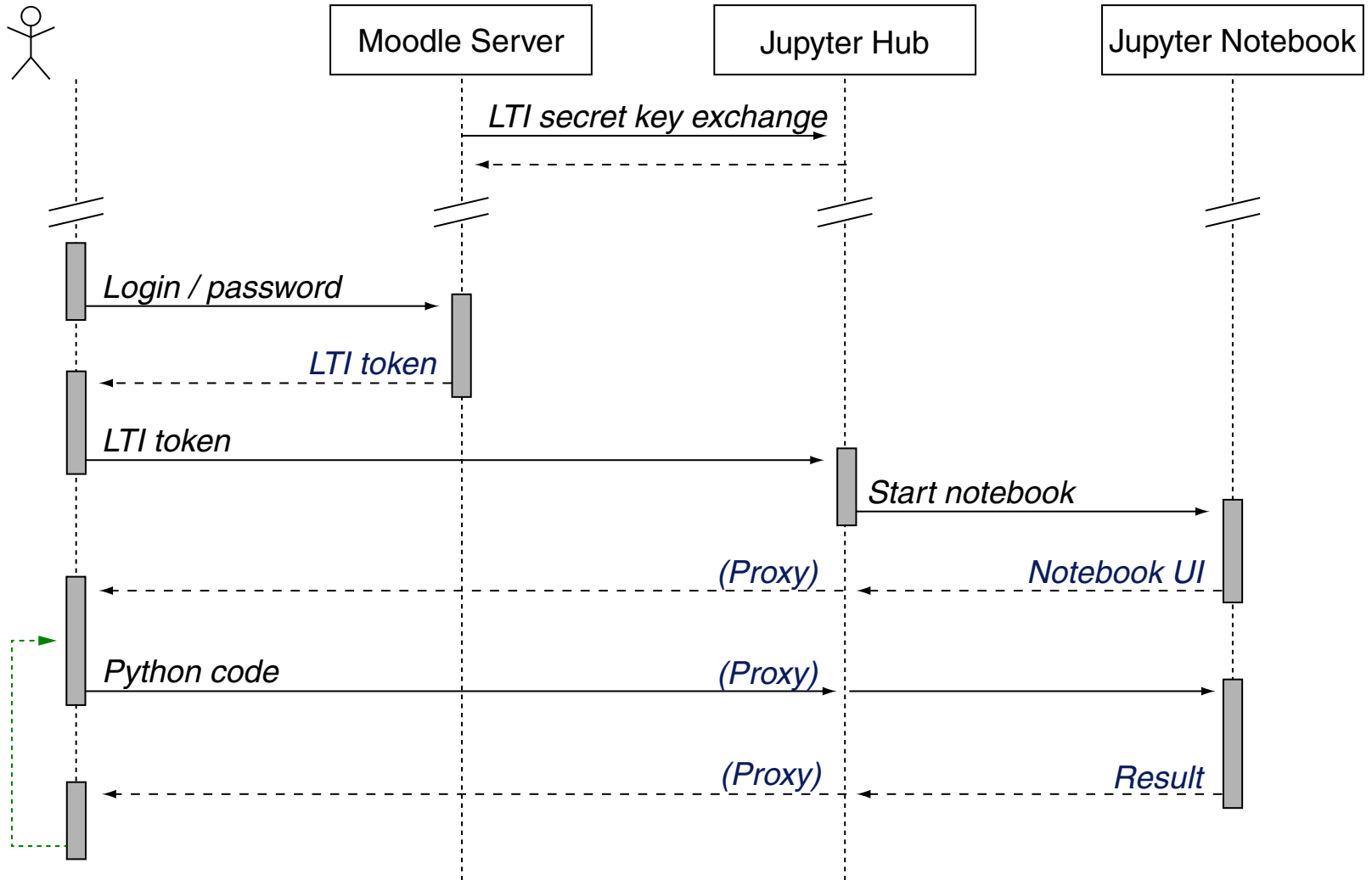
# Software

## Statistics:

- ❑ R Development Core Team.  
*R*  
Version 4.2.  
[www.r-project.org](http://www.r-project.org)
  
- ❑ E. Jones, T. Oliphant, P. Peterson and others.  
*SciPy*  
Version 1.9.  
[www.scipy.org](http://www.scipy.org)
  
- ❑ J. W. Eaton.  
*GNU Octave*  
Version 7.2.  
[www.gnu.org/software/octave](http://www.gnu.org/software/octave)

# Software

## Lab Class Setup



# Software

## Lab Class Setup (continued)

