Data Science. Module V

Machine Learning II

The key to artificial intelligence has always been the representation.

Jeff Hawkins

Necessary

This module is dedicated for custom implementation and research.
What you need is to understand how to learn fast and effective. By the way, if someone didn't check it in previous module, here is nice course on that. And here is the short summary for impatient.

Best approach to get practical skills is to understand how to search relevant information, make research and try to implement it as fast as you can. Only after those tries you will start asking questions and think by yourself.

You can use our materials on topics you need in this module, but you need to understand how to find most relevant information by yourself, having just few keywords.

All links you used on each topic, you have to put in this worksheet.

Here is the list of methods/algorithms you have to work on.

- SVM *with gaussian kernel* (**implement**)
- PCA (**implement**)
- Hierarchical Clustering (**research***)
- Apriori algorithm (**research*)**
- Random Forest (**research*)**
- Neural Networks (**implement)**
  Here you can solve any problem. Use any number of layers, types of layers, activation functions. Requirement: implement feed-forward and back-propagation techniques.

Explanation:

- **implement** == implement algorithm use only python, numpy, scipy, *cvxopt* and matplotlib for visualisation
- **research** == read, understand
- **research*** == only concept, without math details(those who will finish with math, will be additionally rewarded)

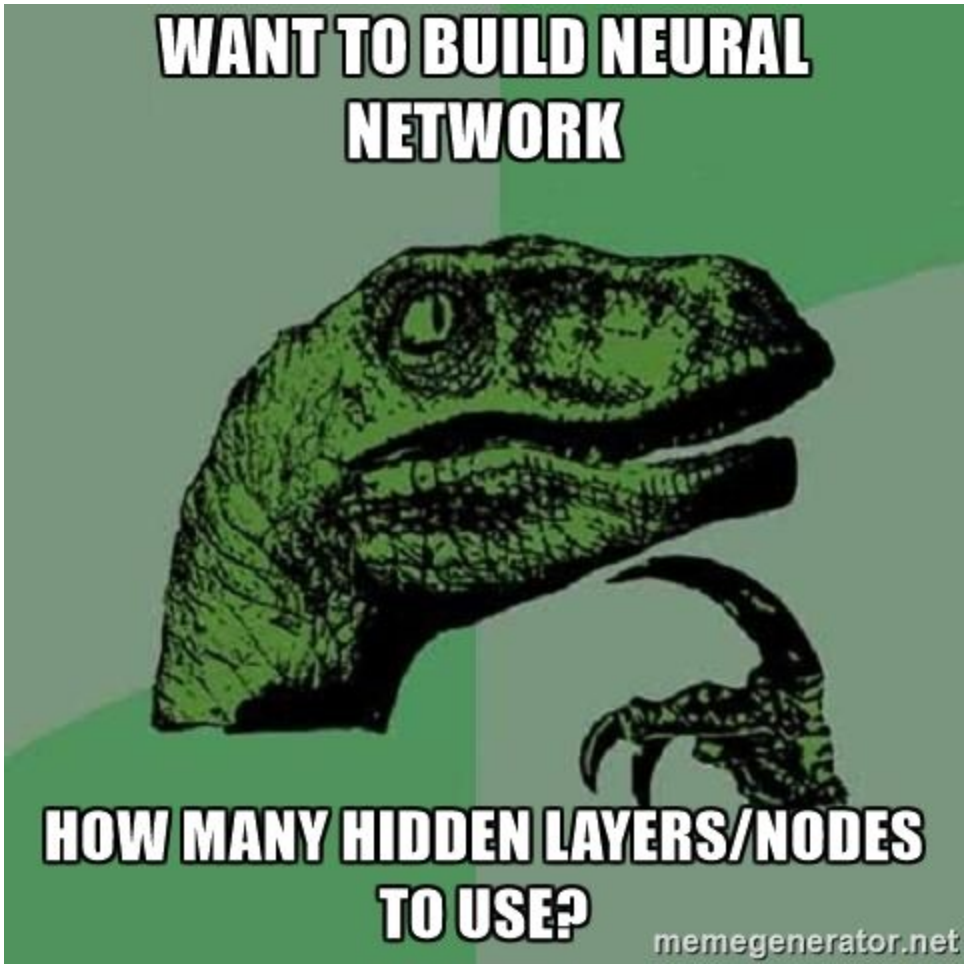
So learn, implement, test, compare.
Choose any dataset here: http://www.datapure.co/open-data-sets
So you need to:

1. *Find relevant information on each of these algorithms and fill in the next sheet.*
   *This sheet is one for all, you have to fill in only one line. If you want to paste multiple links in one cell, just press **ctrl + Enter**. This will help you and your coursemates to make a progress faster.*
2. *Send implemented algorithms/methods (simple and working ones).*
   Deadline is 9th of December
3. *Try it on any dataset you like and compare with sklearn realization (for models).*
4. *Cool discussion about them on the next meeting.*

Resources

- Articles
  - http://machinelearningmastery.com/a-tour-of-machine-learning-algorithms/ - systematization
  - http://www.kdnuggets.com/2016/08/10-algorithms-machine-learning-engineers.html - must know
  - https://www.python-course.eu/machine_learning.php - machine learning tutorial with python
- Courses
  - Machine Learning Coursera Course: https://www.coursera.org/learn/machine-learning
  - Data Science Specialization from Yandex: https://www.coursera.org/specializations/machine-learning-data-analysis
  - Applied Data Science in Python: https://www.coursera.org/learn/python-machine-learning
  - Practical Machine Learning Tutorial with Python Introduction: https://pythonprogramming.net/machine-learning-tutorial-python-introduction/
  - Data Mining Video Lectures: (quick overview) - https://www.youtube.com/playlist?list=PLLssT5z_DsK9JDLcT8T62VtzwyW9LNepV
  - Nice and easy to understand Neural Networks Video Series https://www.youtube.com/watch?v=bxe2T-V8XRs&list=PLiaHhY2iBX9hdHaRr6b7XevZtgZRa1PoU

- Books/PDFs
  - Machine Learning in Python
  - Introduction to Machine Learning Using Python
  - Python Machine Learning
  - Machine Learning with Python/Scikit-Learn
  - Machine Learning in Action
  - Statistics and Machine Learning in Python
- Additional Books:
  - Hastie, Tibshirani, and Friedman's The Elements of Statistical Learning
  - Bishop's Pattern Recognition and Machine Learning
  - David Barber's Bayesian Reasoning and Machine Learning
  - (Great Book)Kevin Murphy's Machine learning: a Probabilistic Perspective
  - Foundations of Machine Learning, Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar
  - Learning From Data, Yaser S. Abu-Mostafa, Malik Magdon-Ismail, Hsuan-Tien Lin
  - Information Theory, Inference, and Learning Algorithms, David J. C. MacKay[free pdf]
  - All of Statistics, Larry Wasserman
  - Probabilistic Graphical Models: Principles and Techniques, Daphne Koller, Nir Friedman
  - Gaussian Processes For Machine Learning, Carl Edward Rasmussen, Christopher K. I. Williams [free pdf]
  - Machine Learning with R
  - Building Machine Learning Systems with Python
  - Machine Learning with Spark
  - Matrix Computations (Johns Hopkins Studies in the Mathematical Sciences): Gene H. Golub, Charles F. Van Loan: 9781421407944: Amazon.com: Books
  - Amazon.com: Convex Optimization (9780521833783): Stephen Boyd, Lieven Vandenberghe: Books



See you soon in Module VI