***Technical Sheet***

This will be a short course on machine learning. It is a short course, not a hurried course. It will have a sum of 10 lectures (6-12 pages each -without code-), and every lecture will have a special theme to it, that we will distinguish by the title color:

1. ***Green Title: Conceptual, Analysis***
   1. Lectures with green titles will be purely conceptual lectures there we will give definition (without going in details to the math) on key concepts of machine learning, also analyze some of its components. Those lecture are helpful to familiarize the reader with the type of situation that occur in solving a problem also the wright way to deal with them.
2. ***Red Title : Mathematical , Theoretical***
   1. These lecture will help transfer the concepts and mechanics of machine learning into equations and mathematical formulas. And learn how to tailor them to fit any given problem theoretically, and derive the concepts of the different algorithms
3. ***Blue Title: Technique, Practical***
   1. In those lectures we will turn the algorithms established in the in theoretical lectures into real programs with Python, TensorFlow, Theano, Scikit-Learn.

# Overview of the Course:

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| Title Of the lecture | Overview |
| The learning Problem | Here we will define what’s a learning problem and the criteria of the applications of machine learning to solve a given problem, also the different type of learning in literature. |
| Is learning Feasible? | Can we generalize from data?  What conditions do the data have in order to export the learning model? |
| Linear Regression | This lecture will serve both as a hands on introduction to the simplest learning algorithm, and to the different frameworks scikit-learn, theano, TensorFlow. |

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| Data Cleaning And Data preparation | An off topic lectures but necessary for dealing with real data, here we will take a look at incomplete datasets, false values, formatting, etc. |

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| Overfitting Error and Noise | Somme concepts on real data issues and their replications. |
| Artificial Neural Networks | The Mathematics of Neural Networks. |
| Deep Neural Networks | Application of DNN using TensorFlow on serval examples. |
| Convolutional Neural Networks | Application of CNN using TensoFlow on multiple examples. |
| Recurrent Neural Networks | Application of RNN using TensorFlow, Keras or Contrib.Layers on some examples. |

This work is inspired by several books and numerous publications including:

1. (Adaptive Computation and Machine Learning series) Kevin P. Murphy-Machine Learning\_ A Probabilistic Perspective-The MIT Press (2012)
2. (Information science and statistics) Christopher M. Bishop-Pattern Recognition and Machine Learning-Springer (2006)
3. Yaser S. Abu-Mostafa, Malik Magdon-Ismail, Hsuan-Tien Lin-Learning From Data\_ A short course-AMLBook.com (2012)
4. Aurélien Géron-Hands-On Machine Learning with Scikit-Learn and TensorFlow\_ Concepts, Tools, and Techniques to Build Intelligent Systems-O’Reilly Media (2017)
5. Q. Ethan McCallum Bad Data Handbook Cleaning Up The Data So You Can Get Back To Work