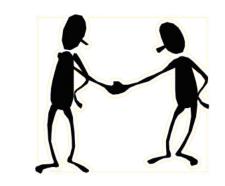
## Practical Courses for Applied Al

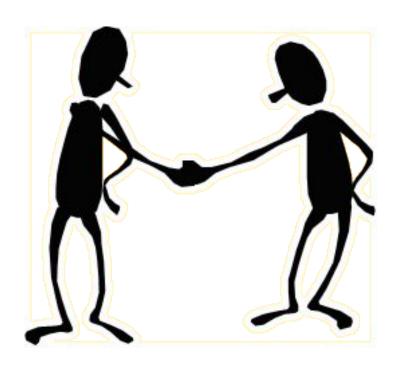
Dr. Ahmad Al Sallab Senior Expert

### Welcome



- Ahmad EL-SALLAB
- Ph.D. Cairo University, 2010-2014
- M.Sc., Cairo University, 2007-2009
- Publications and research
  - 30+ publications in ML/DL, Speech, Comp Vision, Robotics,
     NLP
  - Research gate profile: Ahmad A. Al Sallab
- Valeo, 2008-Now
  - S. Expert/S. Chief of AI/DL
- Intel, 2005-2008
- Lecturer (ITI, CUFE, GUC, NTI,...)

# Introduce yourself!



# Why I am HERE?

# Why I am HERE?

To learn!

Work together  $\rightarrow$  **Learn by doing**:

- Projects
- Research

# What's NOT unique?

#### Everything is already available:

- Al for everyone
- Coursera DL specialization
- Udacity Nano degrees
- <u>Fast.ai</u>
- CS231n Stanford CV

\_

\_

## What's NOT unique?

- Deep Learning with Python, Fchollet (Keras)
  - Notebooks
- Hands-On Machine Learning with Scikit-Learn and TensorFlow
  - Notebooks
- Ian Goodfellow DeepLearning Book

#### AND Much, much more!

Better content from far better scientists!

#### <u>Plus</u>

# All the content will be available with recordings and ALL

# What's unique?

### Work together on projects

The main idea is to learn by doing!

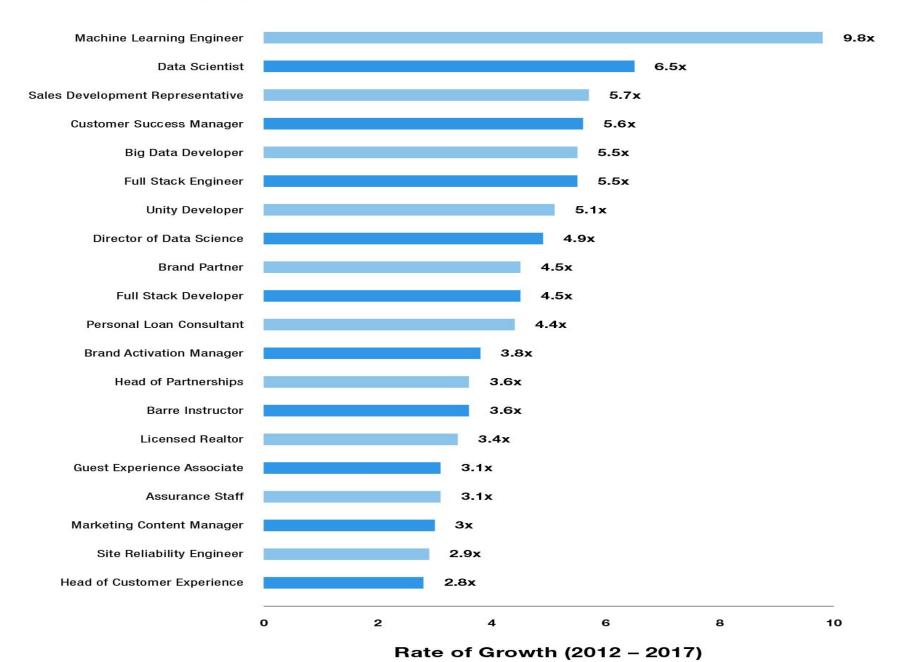
You must do ALL the assignments

You must choose your project from day 1

# Why are YOU here?

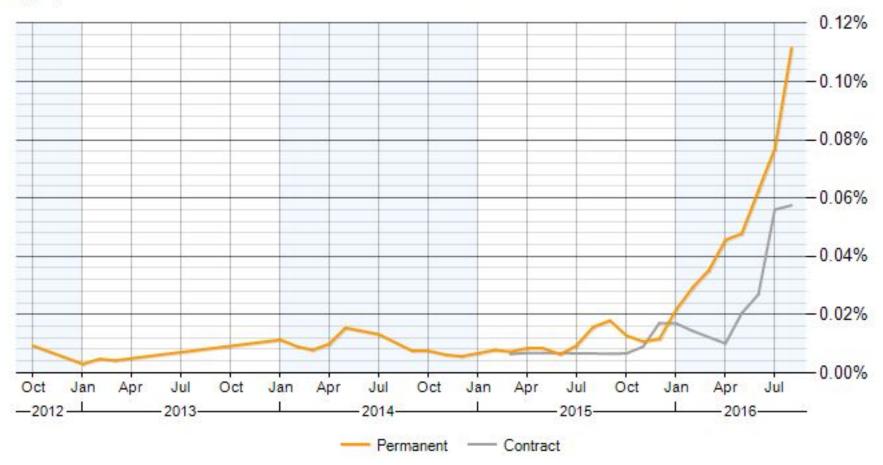
# Looking for a Job?

#### **Top 20 Emerging Jobs**



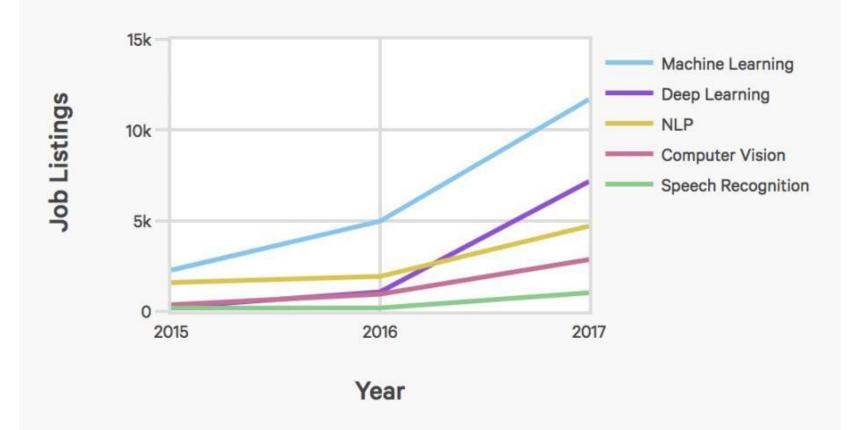
#### Deep Learning Jobs Demand Trend

The demand trend of job ads citing Deep Learning as a proportion of all IT jobs with a match in the Processes & Methodologies category.



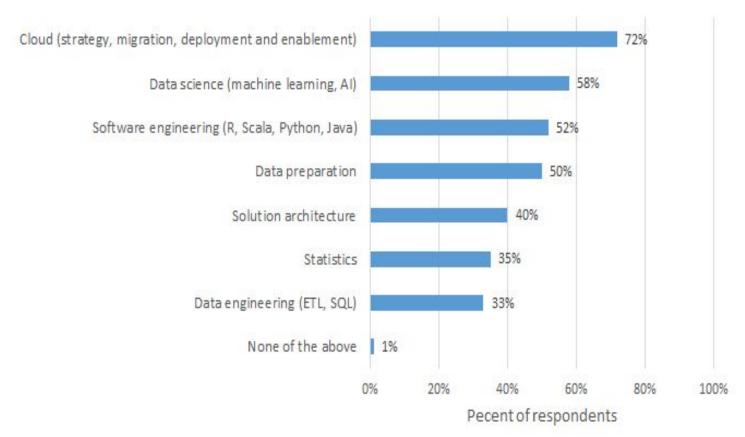
http://www.itjobswatch.co.uk/jobs/uk/deep%20learning.do

#### Job Openings, Skills Breakdown (Monster.com)



Run your own business?

# Which data-related technical skills do you need to achieve your business goals?



https://www.zdnet.com/article/it-jobs-in-2020-preparing-for-the-next-industrial-revolution/

Want to advance technology?

Al revo Google now 201



FB Chatbot

**IBM Pepper** 

Apple Siri

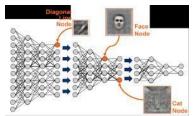


**IM** GENET Microsoft & Google "Superhuman" Image Recognition

SegNet



**Image** Video



**AlexNet** 

**NLP** 

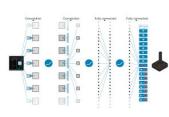


**MS** Cortana



DeepMind AlphaGo

**Robotics/ Control** 



**Atari** DeepMind



Comma.ai **HAD** 

Speech



MS Speech



DeepSpeech 2

### Course Strategy

- Python
- Ipython notebooks
- Keras
- Google Colab
- Kaggle



Practice vs. Theory

#### **Practice the Theory!**

## Coursat.ai

http://coursatai.s3-website-us-east-1.amazonaws.com/



# PRACTICAL COURSES FOR APPLIED AI



**APPLY** 



REFINE



**DEPLOY** 

### **Tracks**

#### ML basics

- Introduction to AI and Machine Learning
- Linear Regression
- Linear Classification: Logistic Regression
- Evaluation protocols and ML process

#### ML for Data science

- Large-margin classifiers (SVM)
- Non linear Classifiers: Kernel SVMs and Neural Networks
- Meta Algorithms: Ensemble methods, Boosting and BAgging (XGBoost, GBM, LightGBM,...etc)
- Unsupervised learning 1: Clustering
- Unsupervised learning 2: Dimensionality reduction

#### DL/DNN basics:

- The mathematical Building Blocks of Neural Networks
- Optimization algorithms and Backpropagation
- Getting started with Neural Networks coding and DL frameworks (Keras)

#### **CV Track NLP Track** DL for CV: DL for NLP: - Introduction to Deep Learning in - Introduction to Deep Learning in NLP Computer Vision - Word vectors 1: Embeddings and Word2Vec - Convolutional Neural Networks - Word vectors 2: Coocurrence matrix, SVD - ConvNets on small datasets and GloVe - ConvNets Meta-architectures, Language Modeling Pre-trained Nets and Transfer Recurrent Neural Networks and Neural learning Language Models (NLM) Visualization of ConvNets Text classification with RNNs and text pre-processing Text classification with ConvNets and word vectors CV Applications with DL: NLP Applications with DL: Review of ConvNets Architectures - Neural Machine Translation with seq2seq Semantic Segmentation with Deep models Learning Full Attention models and Transformers Signle Object Detection Transfer learning in NLP: ULMFiT Multiple Object Detection - Modern Neural NLP: BERT, GPT and Introduction to Generative **XLTransformers** Adversarial Networks (GANs

## Al in Computer Vision

"From pixels to Semantics"

# Start early with Kaggle!

https://www.kaggle.com/c/digit-recognizer

https://www.kaggle.com/c/dogs-vs-cats-redux-kernels-edition

https://www.kaggle.com/c/house-prices-advanced-regression-techniques

https://www.kaggle.com/c/just-the-basics-strataa-2013

#### Course Plan

- 3hrs, Twice a week (or more)
- Google Colab
- PROJECT Kaggle
  - From Day 1
- Google Classroom → Post material, assignments,...etc (one way)
- Slack (ALL ways communication and discussion)
  - send your emails to <u>ahmad.elsallab@gmail.com</u> (if not already joined)
- Assignments
  - Assignments  $(4-5) \rightarrow 40\%$
  - Project (Kaggle)  $\rightarrow$  60%
    - Better to start from day 1
    - Open to proposals

### What this course is NOT about?

- Particular framework (TF, Pytorch, OpenCV,...)
- Optimized ML and deployment (Embedded or web)
- Fresh/latest SoTA

#### **Course Contents**

- Introduction to Al
- Python, numpy and ipython basics (optional)
- Supervised ML Basics: Regression and Classification
- Mathematical building blocks of neural nets
- Getting started with Neural Nets programming with Keras
- Machine learning process and evaluation protocols
- Introduction to ConvNets
- Transfer learning 1: Using ConvNets with small datasets
- Transfer learning 2: Using pre-trained ConvNets
- Visualizing ConvNets
- Semantic segmentation
- Single Object Detection
- Multi Label Classification
- Multiple Objects Detection

## Candidate projects

```
https://www.kaggle.com/c/aptos2019-blindness-detection
https://www.kaggle.com/c/siim-acr-pneumothorax-segmentation
https://www.kaggle.com/c/rsna-pneumonia-detection-challenge
https://www.kaggle.com/c/ultrasound-nerve-segmentation
https://www.kaggle.com/c/intel-mobileodt-cervical-cancer-screening/
https://www.kaggle.com/c/state-farm-distracted-driver-detection
https://www.kaggle.com/c/carvana-image-masking-challenge
https://www.kaggle.com/c/3d-object-detection-for-autonomous-vehicles/
overview
https://www.kaggle.com/c/bosch-production-line-performance
https://www.kaggle.com/c/open-images-2019-object-detection
https://www.kaggle.com/c/cdiscount-image-classification-challenge/
https://www.kaggle.com/c/airbus-ship-detection
https://www.kaggle.com/c/tgs-salt-identification-challenge
https://www.kaggle.com/c/dstl-satellite-imagery-feature-detection/
```

### References

#### Everything is already available:

- Al for everyone
- Coursera DL specialization
- Udacity Nano degrees
- <u>Fast.ai</u>
- CS231n Stanford CV

-

\_

### References

- Deep Learning with Python, Fchollet (Keras)
  - Notebooks
- Hands-On Machine Learning with Scikit-Learn and TensorFlow
  - Notebooks
- Ian Goodfellow DeepLearning Book

# Lecture 1: Introduction to Al

Dr. Ahmad Al Sallab Senior Expert

# Break + Survey

 $\frac{https://docs.google.com/presentation/d/1mgK\_uuL7nds3JP1cq1SsmDlz3pL46g79CADOIRb-etU/edit}{\#slide=id.g5efa052746\_0\_6}$