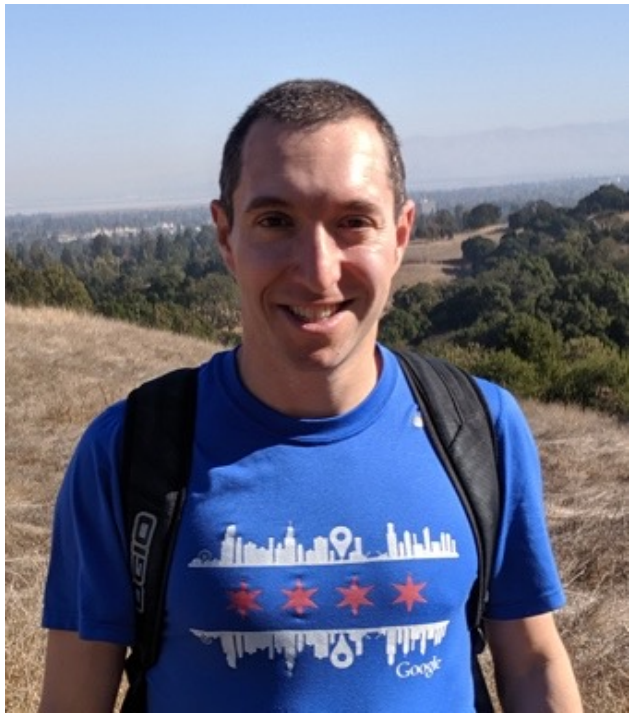
# Data Science Upskilling Workshop

Oren Livne and Jiangang Hao
Educational Testing Service

NCME 2022 Training Workshop – 4/10/2022

# About Us

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# Welcome to the Data Science Upskilling Workshop!

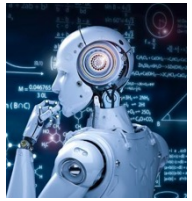
- We assume you performed the setup beforehand (we will also briefly go through the setup)...
- Materials is presented on slides and jupyter notebooks.
- Follow along, and *try the code yourself*. We added optional homework exercises you can do later.
- Please ask any questions; reserve them to the end of each section to save time.
- Have fun!

# An Urgent Challenge in Assessment

*Digitally-Based Assessment (TBA) provides a lot of data about learners, but how do we make sense of it?*

Train Psychometricians & Data Scientists

Engineering Challenges



Statistical & Computational Challenges

Increase measurement precision
Identify response patterns
Identify new constructs

# ETS Data Science Academy

## Syllabus

IN A NUTSHELL

PYTHON ECOSYSTEM
Anaconda, Jupyter, Python
Week 1

DATA WRANGLING
Json, Xml, Pandas, Validation
Week 2

SPEEDING UP COMPUTATION
Jit, parallelization, GPU
Week 3

INTERACTIVE VISUALIZATION
Matplotlib, plotly, ipywidgets
Week 3, 4

DATA MODEL & PROCESSING
Relational, document, batch, stream
Week 5

VERSION CONTROL
Hash, Git, Github
Week 5

MACHINE LEARNING
Supervised, Unsupervised
Week 6

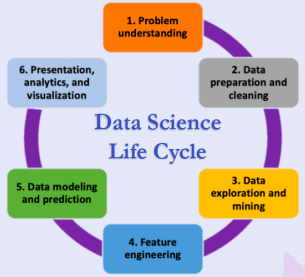
AI AND DEEP LEARNING
DNN, RNN, CNN
Week 7

CLOUND COMPUTING
AWS, SageMaker, Lambda, S3
Week 8

## Capstone Projects

Week 9 – 10

Make sense of the process data from remote testing




UPSKILLING

## Learning Goals

We aim at introducing core data science techniques and machine learning/AI methods in the context of digitally based learning and assessments to help psychometrics practitioners better prepared for the increasingly big and complex data!

## Instructors

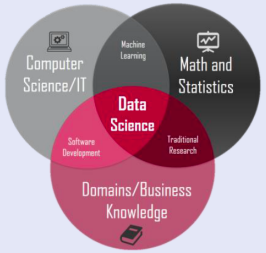
Oren Livne: olivne@ets.org
Jiangang Hao: jhao@ets.org
Other guest speakers

## Data Science Academy

FOR PSYCHOMETRICIANS & DATA ANALYSTS

SPONSORED BY: PSDS

2 - 4 HOURS/WEEK FOR 10 WEEKS



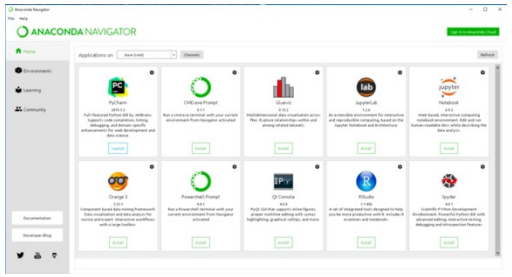

LECTURES & HANDS-ON EXERCISES
CAPSTONE PROJECTS
BASED ON REAL DATA EXAMPLES AT ETS

Season 1: July - October 2020

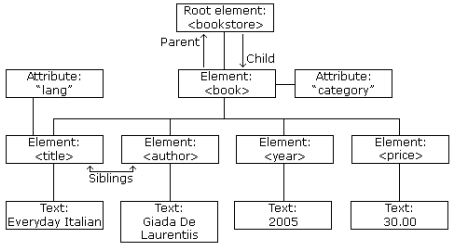
Welcome

# Learning Goals

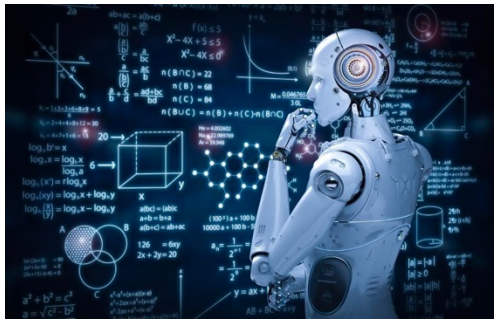
**Develop participants' basic working skills for manipulating complex processed data.**




Work within a development environment

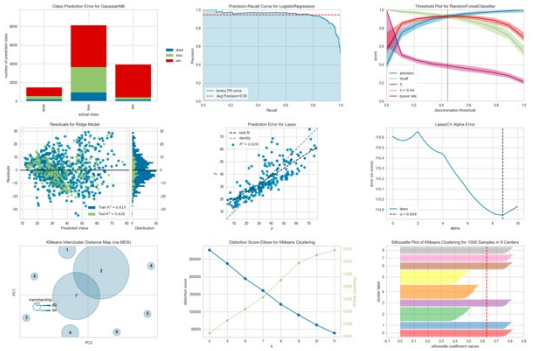



Wrangle XML & JSON data



Understand machine learning basics and apply them to solve real problems


Write high-quality Python code



Create data visualizations

# Environment Setup

# Development Environment is there to make your life easier

1. Install anaconda

https://www.anaconda.com/products/individual


NOTE: Conda's default package distribution is no longer free for commercial use. You should use the conda-forge channel for free use.

# Development Environment is there to make your life easier

1. Install anaconda.
2. Create notebook.
3. Manage virtual environments *within anaconda.*
4. Install and uninstall packages.