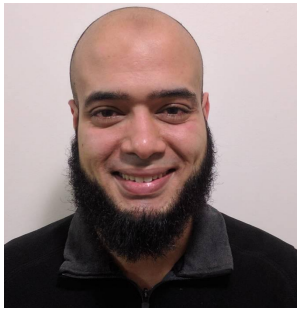
Machine Learning
Network Design Challenge

Mostafa S. Ibrahim
Teaching, Training and Coaching for more than a decade!

Artificial Intelligence & Computer Vision Researcher
PhD from Simon Fraser University - Canada
Bachelor / MSc from Cairo University - Egypt
Ex-(Software Engineer / ICPC World Finalist)



Regression with missing values

- Assume we have a source of Data named X1. Each example of this source has 40 numerical features in range [0-1]
  - There are is relevant semantic connection between every pair of features
  - Assume we have another source of Data named X2. Each example of this source has 60 numerical features in range [0-1]
- We can concatenate an exame x = [x1 + x2] of **100 features** and use it to regress a value y
- The challenge: While all our data has missing features, in real inference, up to 90% of the features can go missing.

Challenge

- Design an NN based solution for this problem
- A straightforward solution is to concatenate x1+x2 and do regression
  - We can simulate the missing data in our runs
  - Cool but we found that the network doesn’t work well
    - Our analysis: this might be due to have many missing data during inference
- Behind the scenes
  - I want to motivate **architecture design skills** in deep learning
  - So think in building a complex network structure

"Acquire knowledge and impart it to the people."

"Seek knowledge from the Cradle to the Grave."