



UNIVERSITY OF
TORONTO



Video 2: What is unsupervised learning?

Introduction to Machine Learning

Prof. Nicolas Papernot

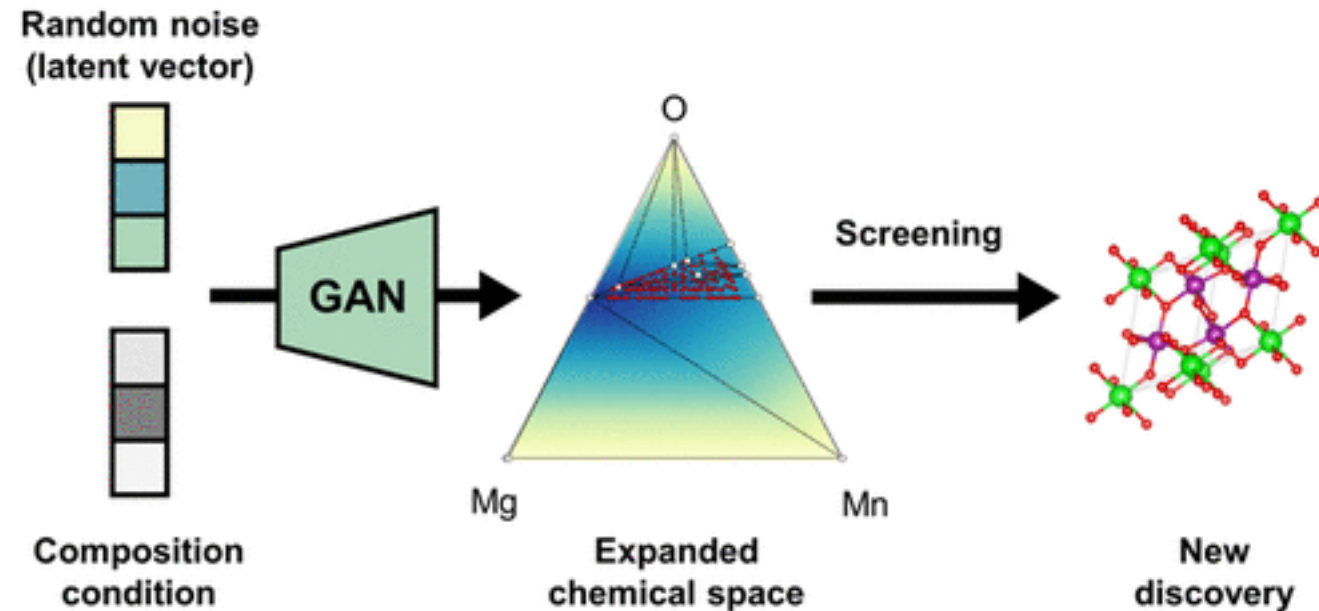
Material used in this course is adapted from several prior iterations of similar courses taught by others. This includes CSC321 by Prof. Grosse and Coursera's ML course by Prof. Ng.

Capture patterns in raw data

- Generative modeling
- Self-supervised learning
- Compression

In this course:

- Clustering
- Dimensionality reduction
- Data visualization



Generative Adversarial Networks for Crystal Structure Prediction
Kim et al.

Capture patterns in raw data

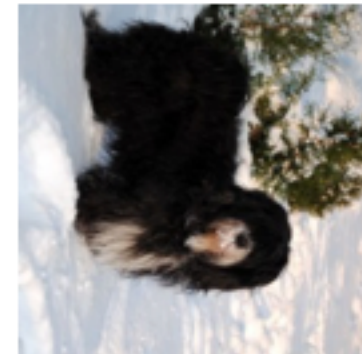
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In this course:

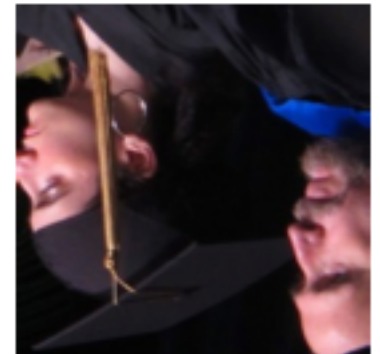
- Clustering
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90° rotation



270° rotation



180° rotation

Unsupervised Representation Learning by Predicting
Image Rotations
Gidaris et al.

Capture patterns in raw data

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Learned Video Compression
Rippel et al.

Clustering examples

Market segmentation

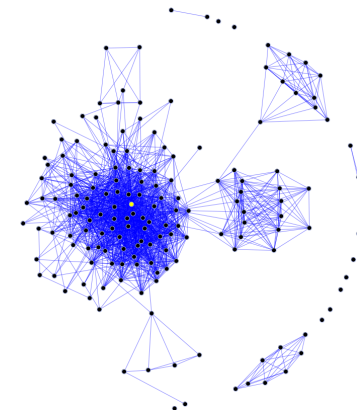


Recommendation / search results

Source: gettyimage



Source: favpng



Social network analysis

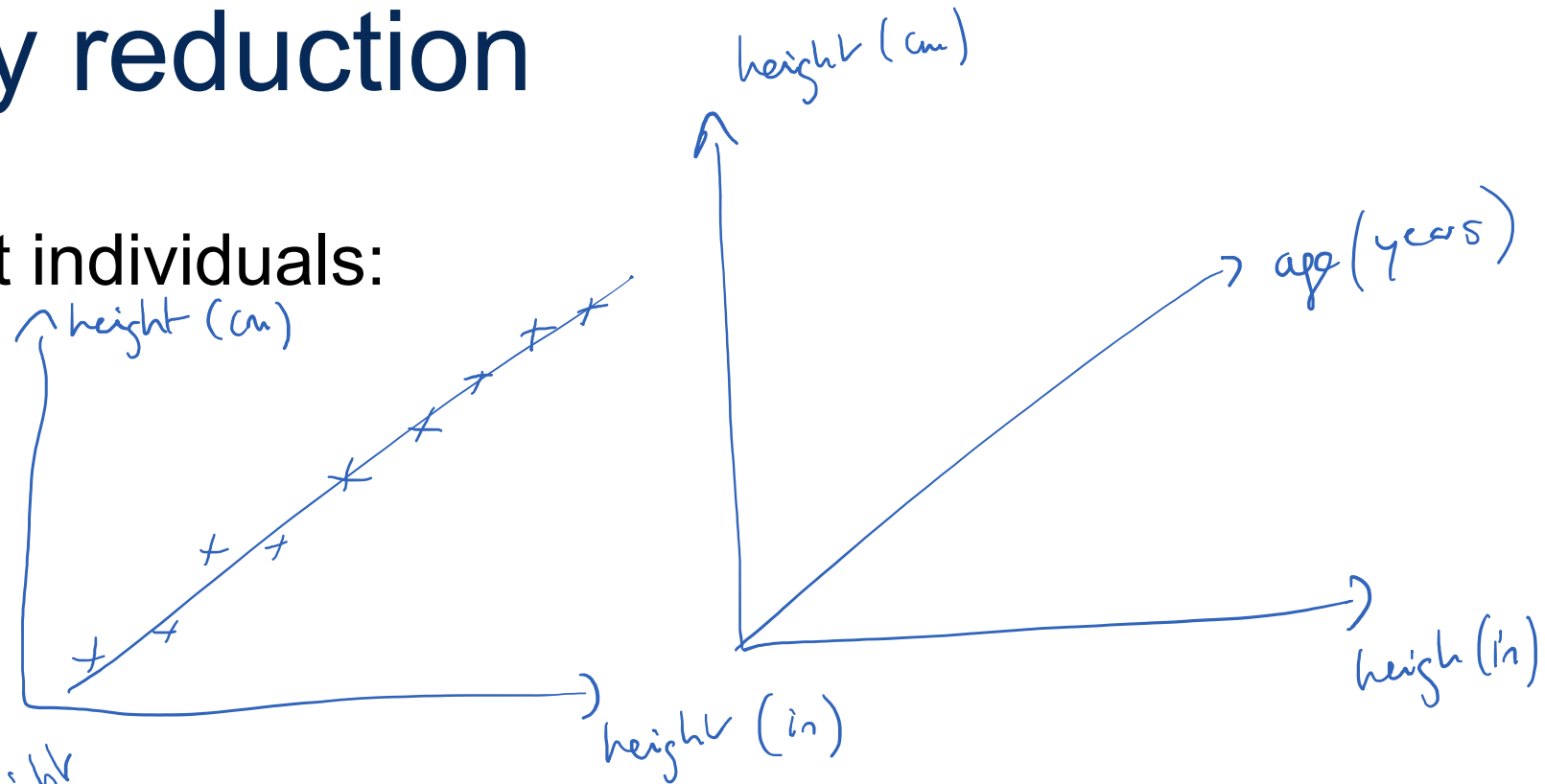
Source: Wikipedia.org

Dimensionality reduction

- Collected data about individuals:

- Height (cm)
- Height (in)
- Age (years)

3D

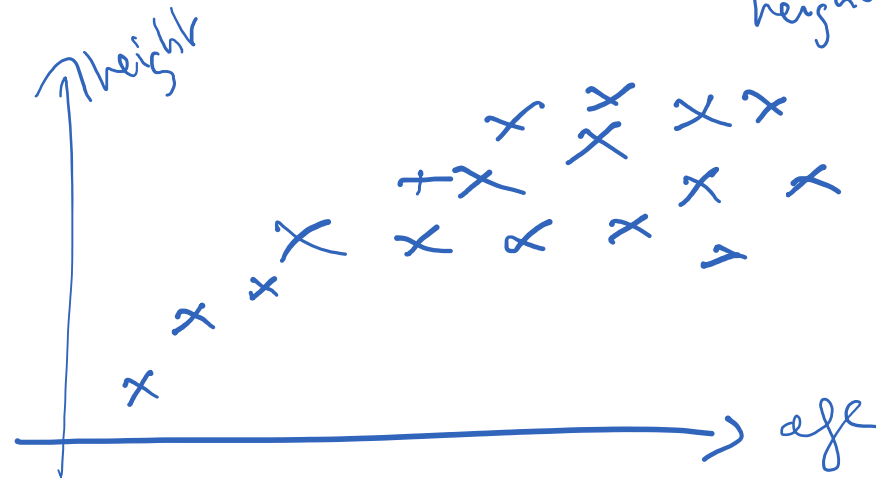


↓

Height (cm)

2D

Age (years)

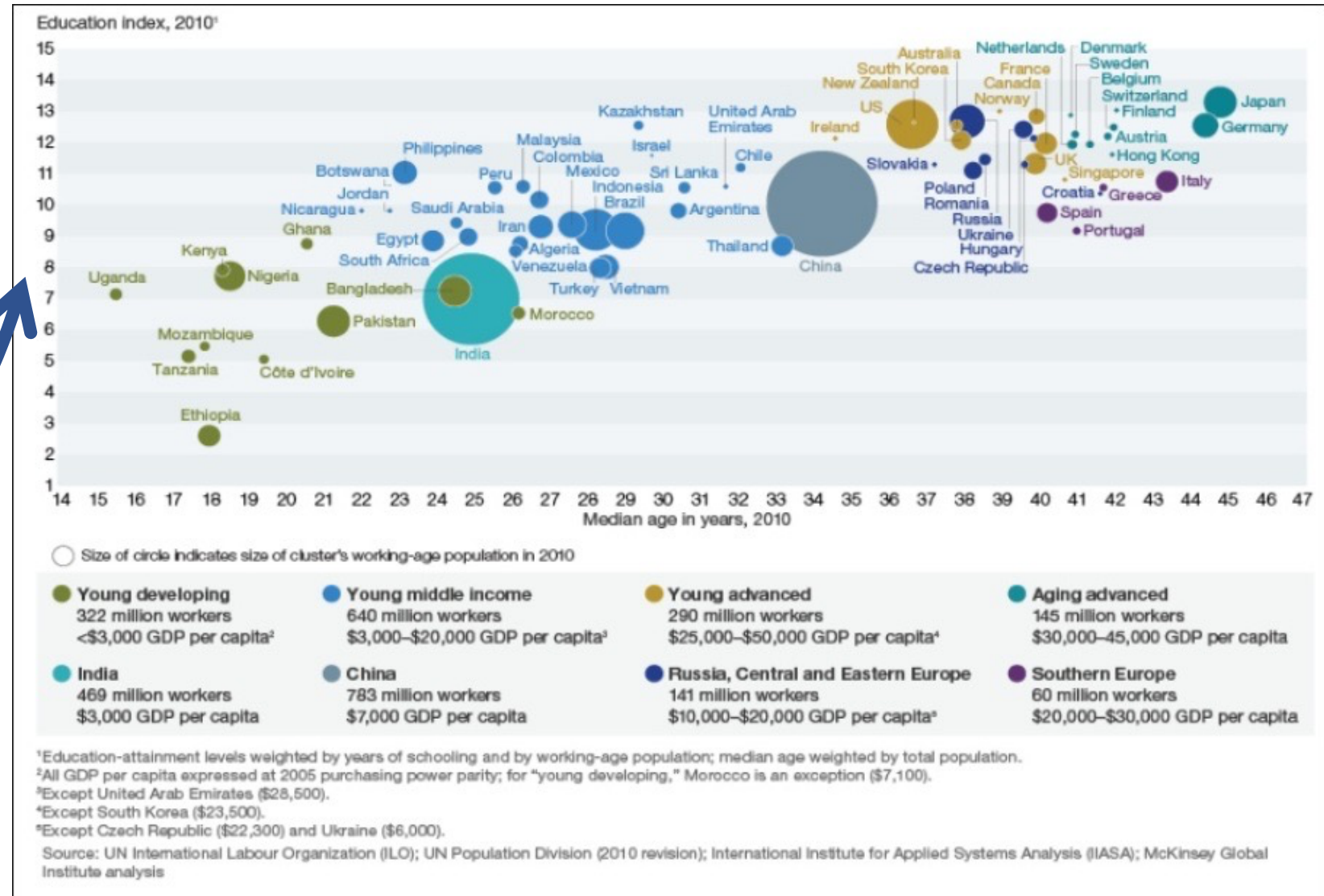


Data visualization

Examples of features:

- GDP
- Life expectancy
- Mean household income
- Students:teacher ratio
- Higher education budget
- Number of books in library

Instead aggregate all of this information into a single feature



Hard (and expensive) to collect labeled
data required for supervised learning