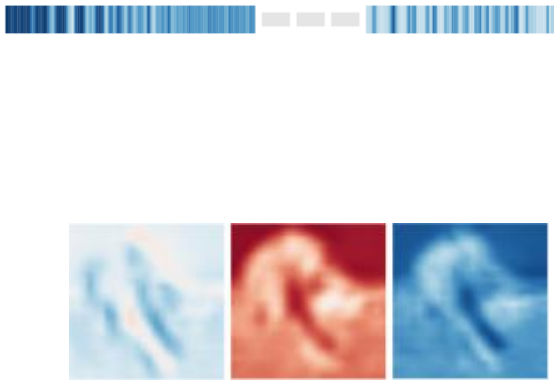
Large Scale Representation Learning In-the-wild

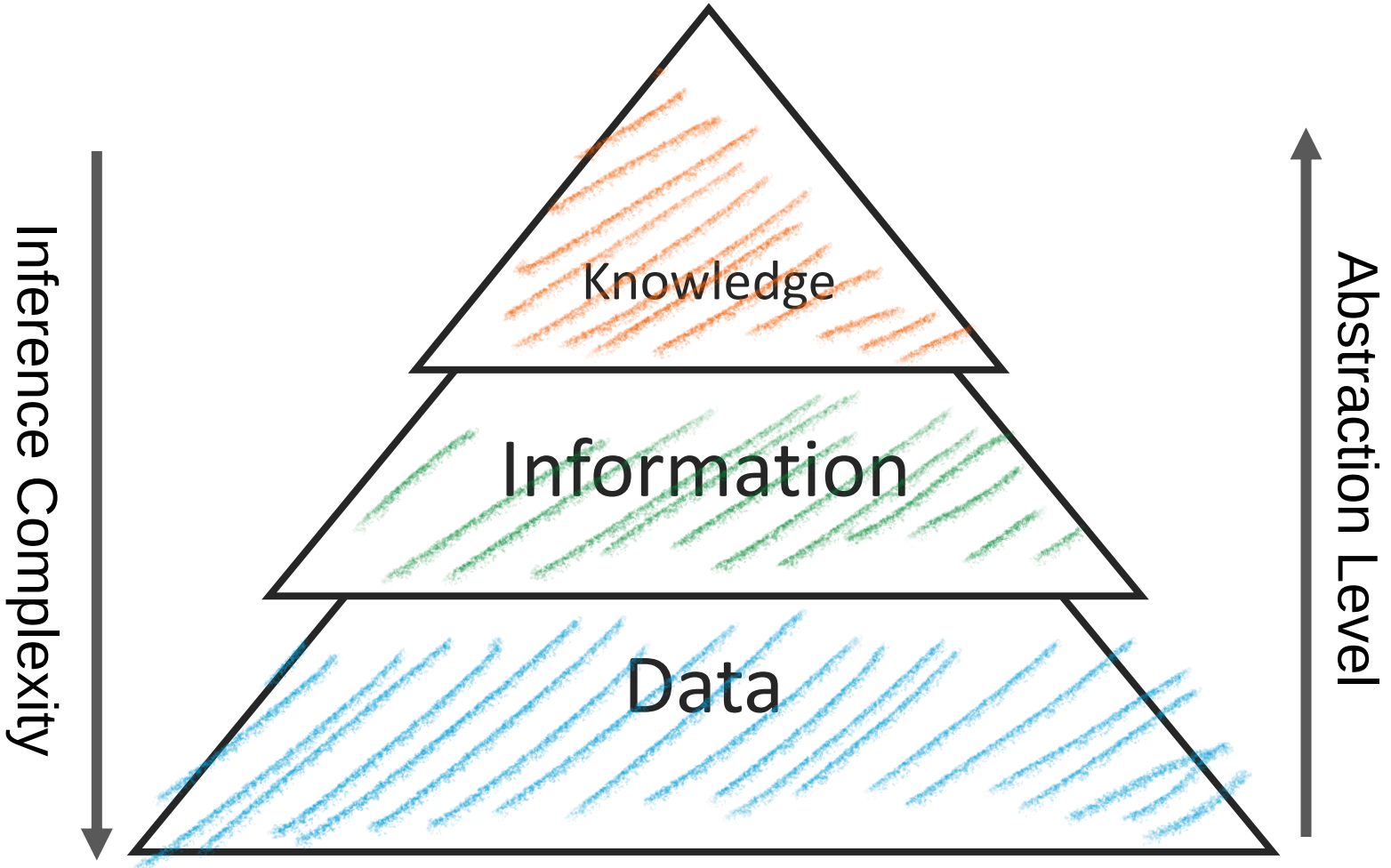
Hadi Abdi Khojasteh

TELIGHT, Czech Republic

hadi.abdikhojasteh@telight.eu

August 13th, 2022



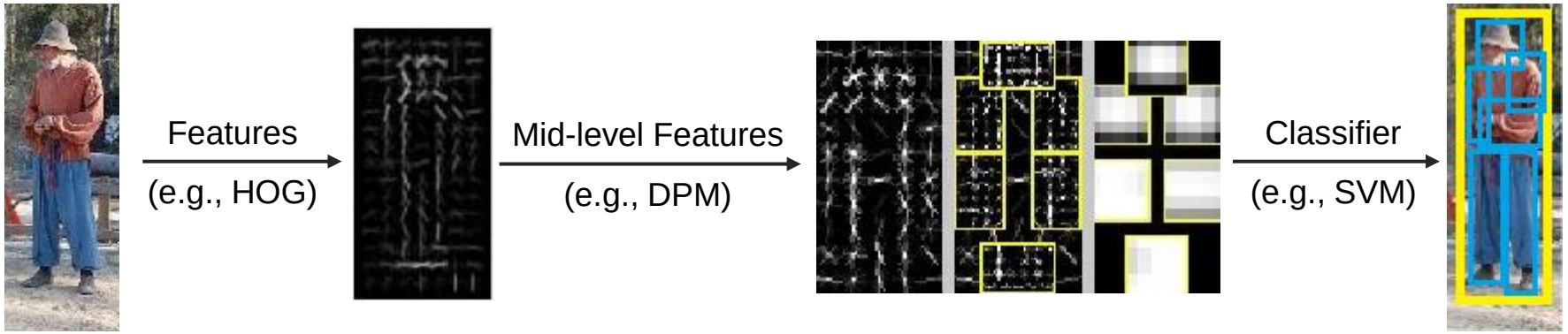


PyData Yerevan

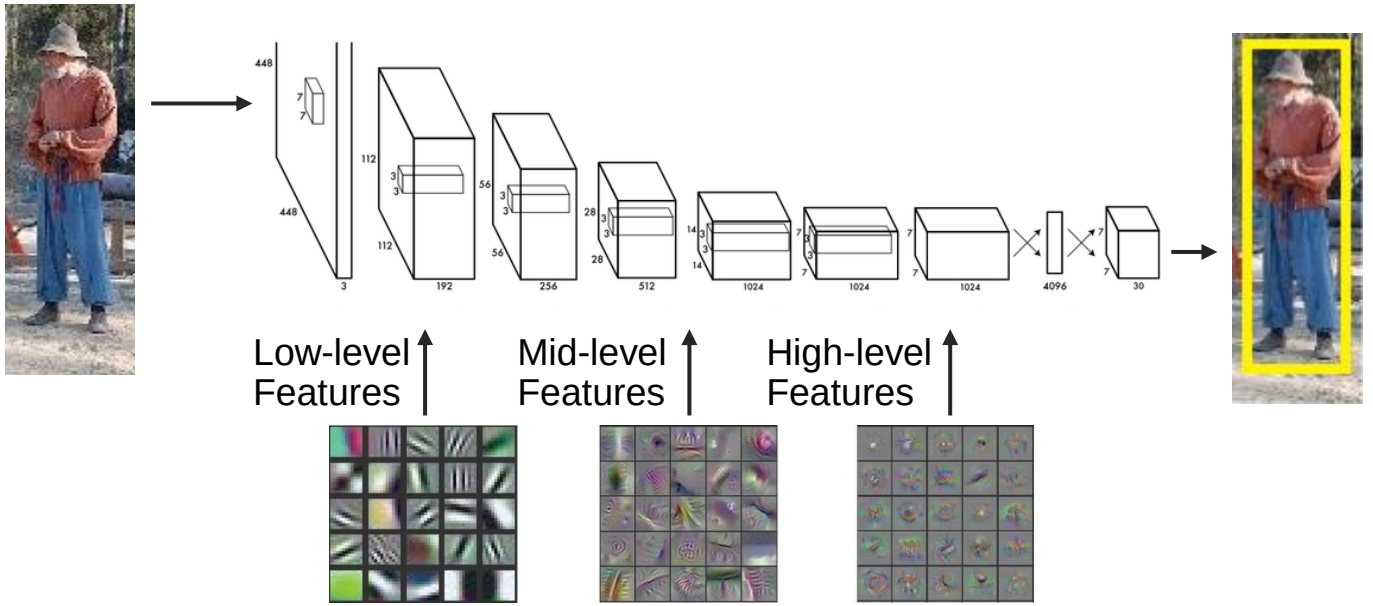
August 13th, 2022

Deep Learning: End-to-end approach

General Computer Vision

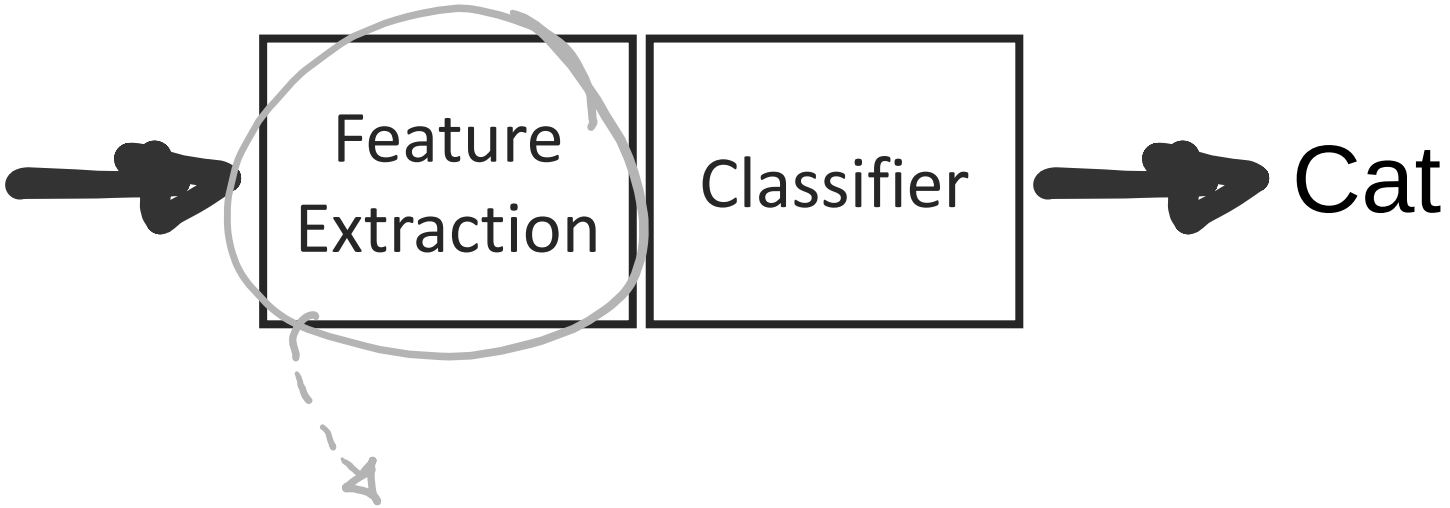


Deep Learning



Supervised Representation Learning

Repurpose



Object Detection

Semantic Segmentation

Visual Question Answering

…

Why unsupervised/self-supervised learning?

- Nature dose not use supervised learning most of the time

- Taking advantage of huge unlabeled data

- Answer new questions

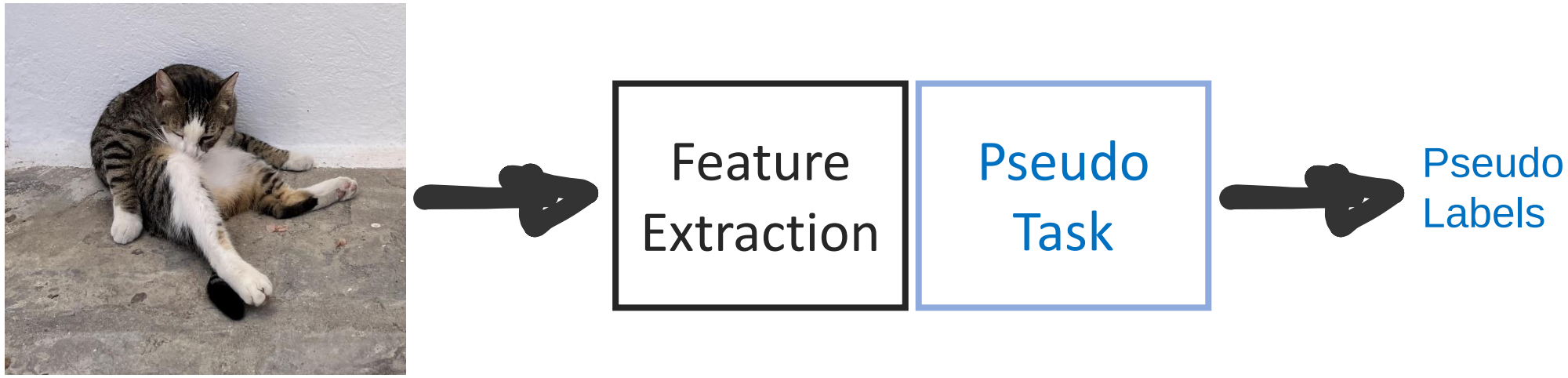
Learning how the world ticks

- Objective is to learn distribution that data comes from

Supervised: $p(y|x)$
Unsupervised: $p(x)$

- So long as our machine learning models “cheat” by relying only on surface statistical regularities

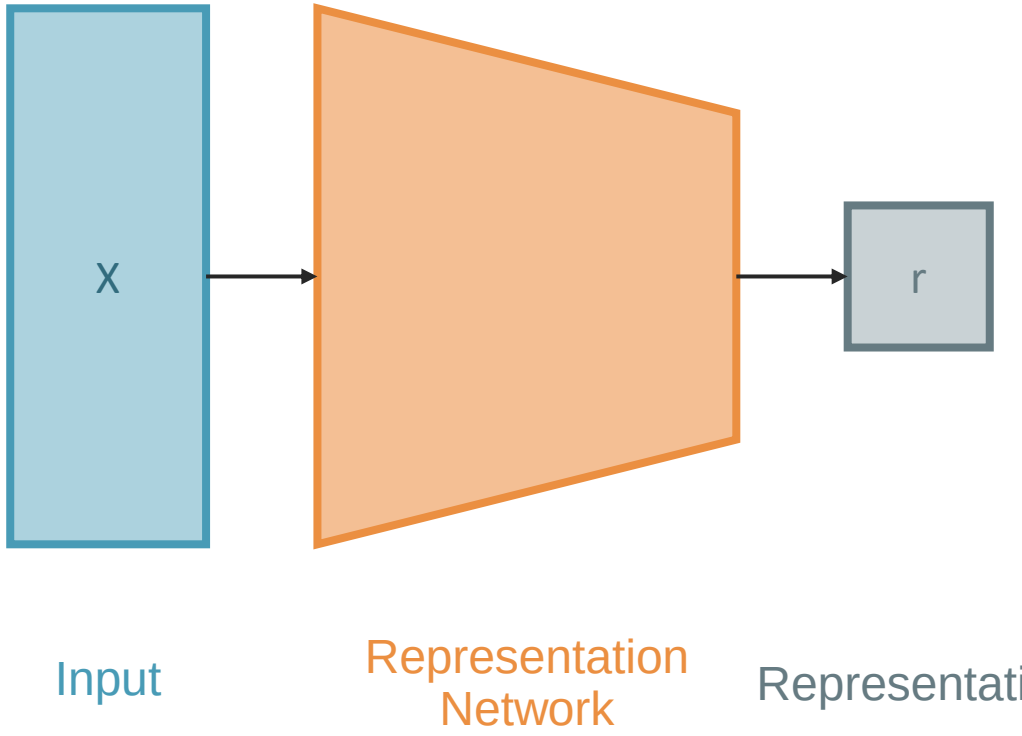
Self-supervised Representation Learning



Self-supervised: pseudo labels

- Low cost
- More scalable
- Flexible

(Representation / Encoder / Inference) Networks



Size: Smaller or larger than x

Structure: Flat or interpretable

Type: Continuous or discrete

Shape: Fixed or variable

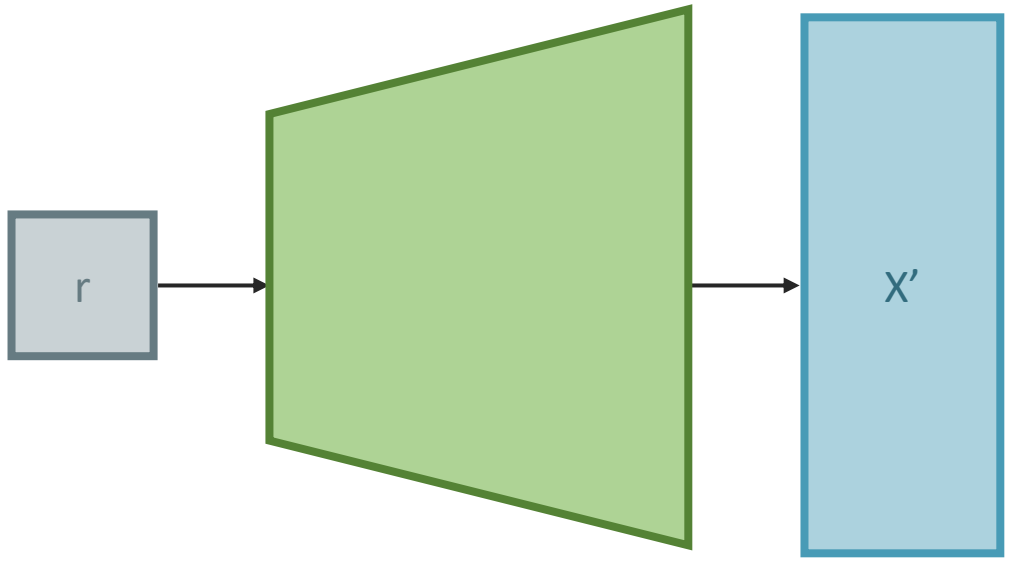
Disentangled or not

- Multi-layer perceptron
- ConvNet
- Transformer
- Recurrent neural net

PyData Yerevan

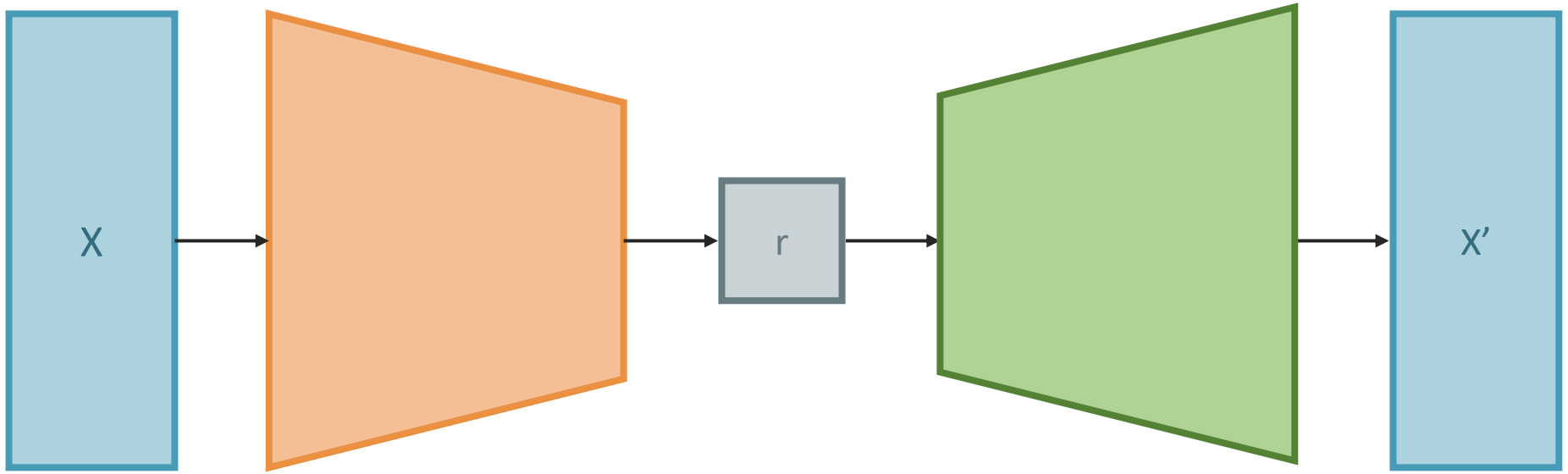
August 13th, 2022

(Generation / Generator / Decoder) Networks



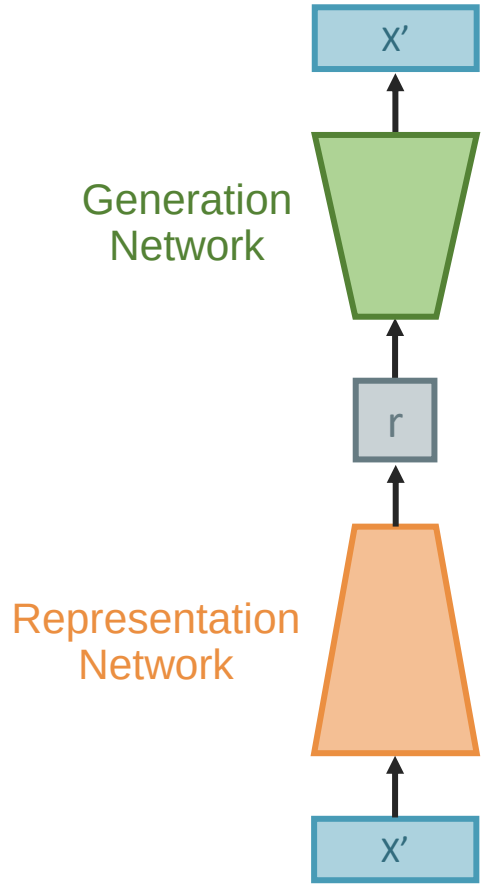
- Multi-layer perceptron
- DeconvNet
- Transformer
- Recurrent neural net

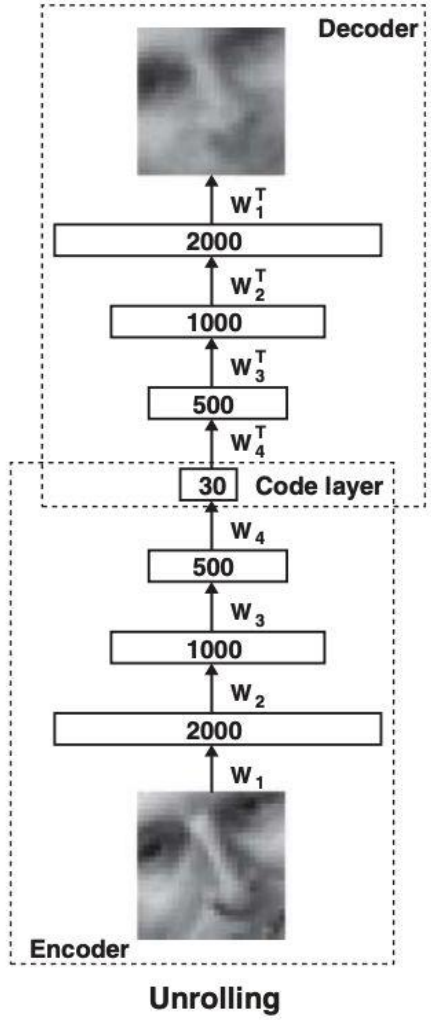
Autoencoders



Autoencoders: What are they for?

- Density estimation
- Dimensionality reduction
- Image generation
- Denoising
- **Representation learning**

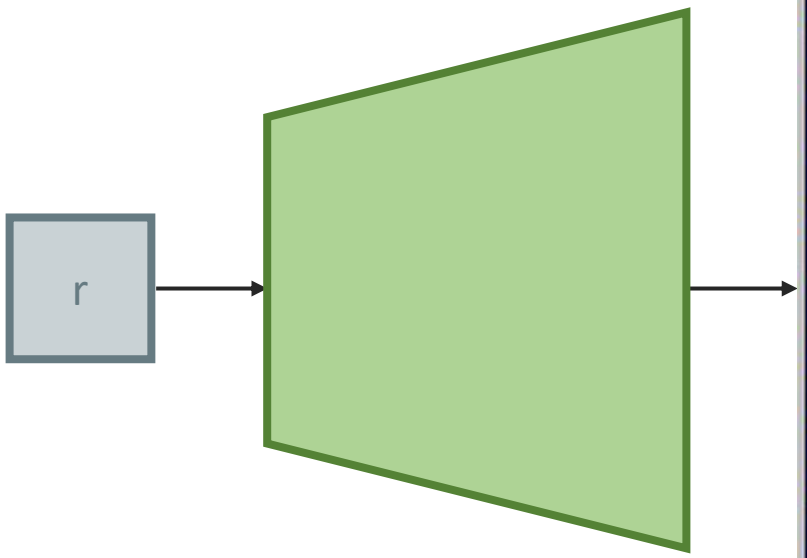




PyData Yerevan

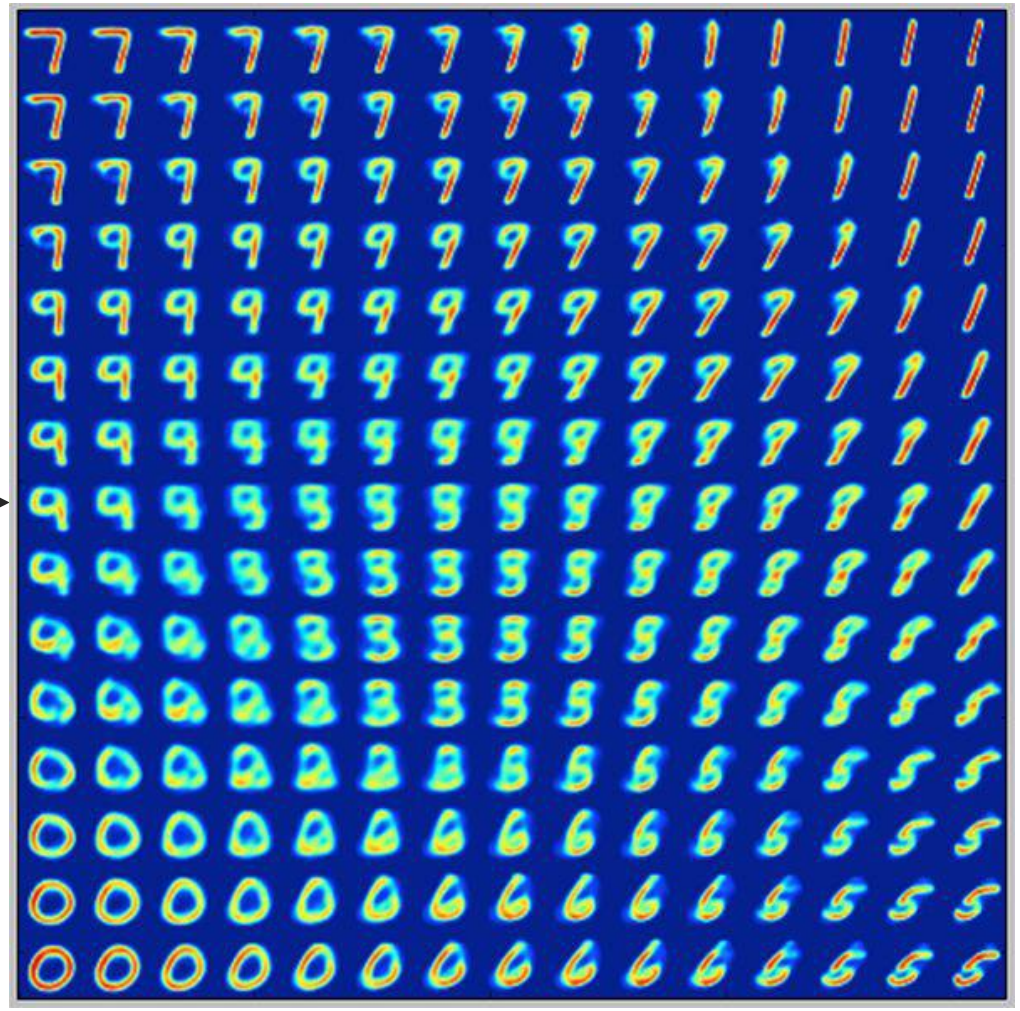
August 13th, 2022

Autoencoders

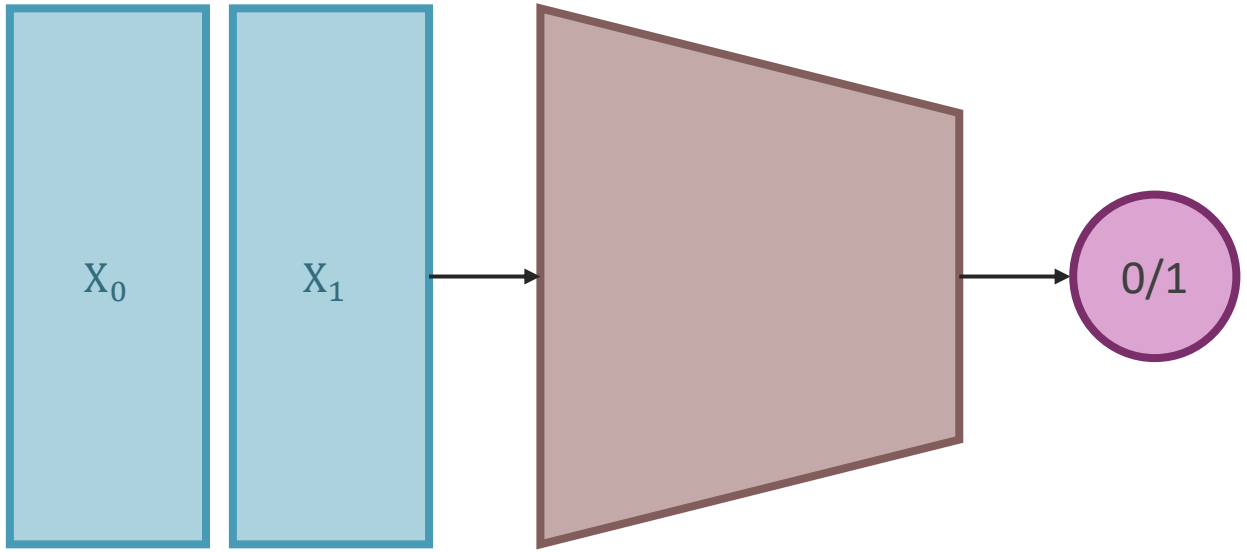


Representation

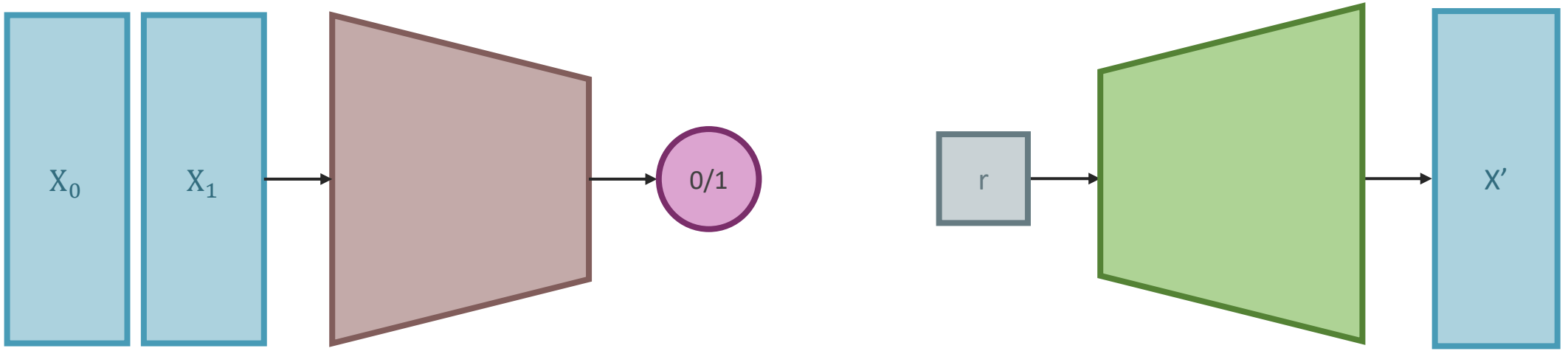
Generation Network



Discriminators / Contrastive Networks



Generative adversarial networks



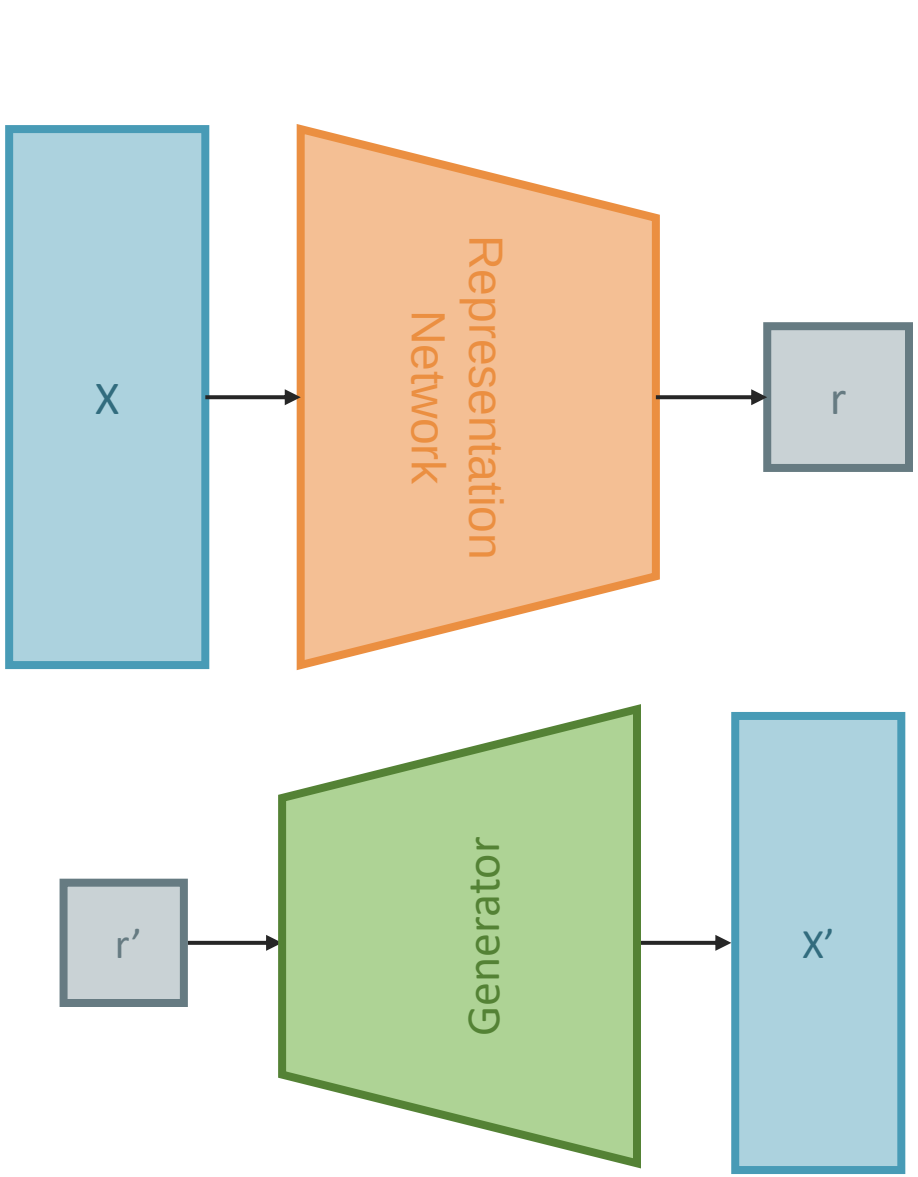
PyData Yerevan

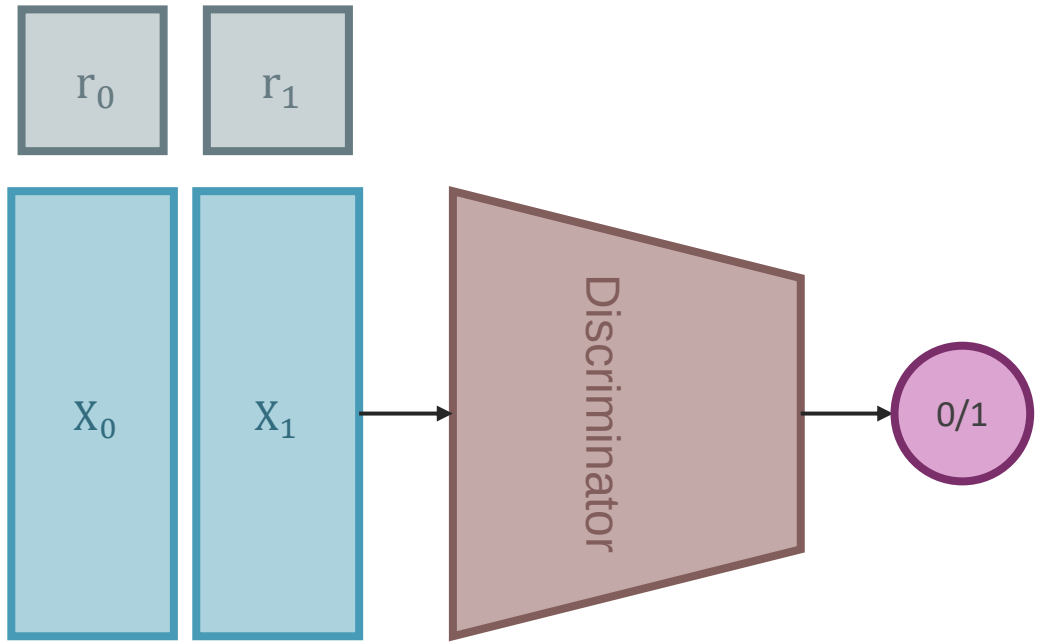
August 13th, 2022

Generative adversarial networks

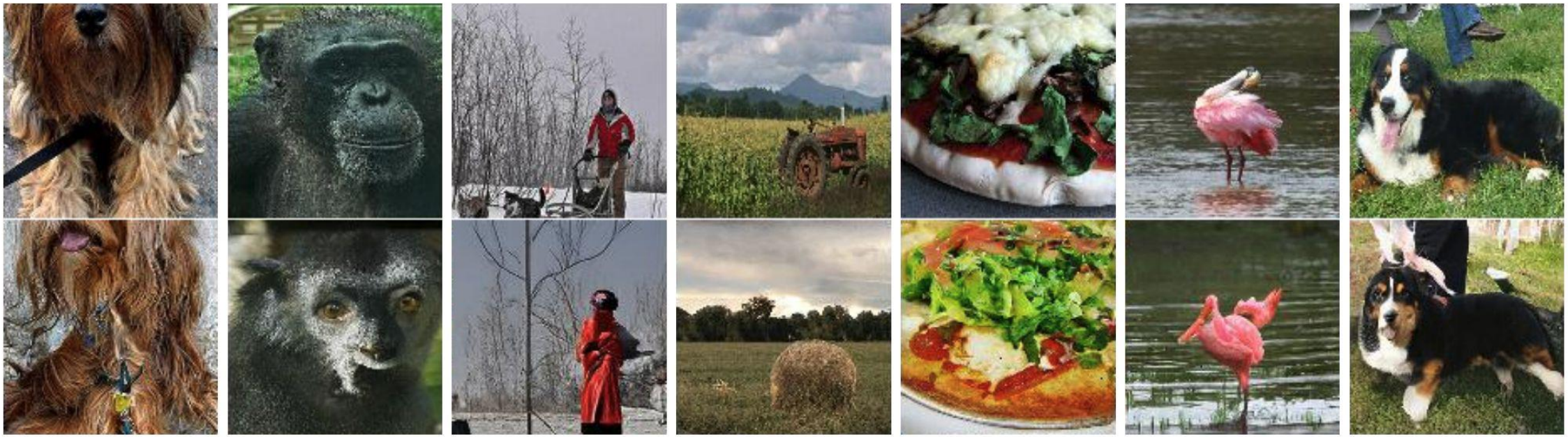
PyData
Yerevan
August 13th, 2022

BiGAN


X
Representation Network
r
r'
Generator
X'


r_0
r_1
X_0
X_1
Discriminator
0/1

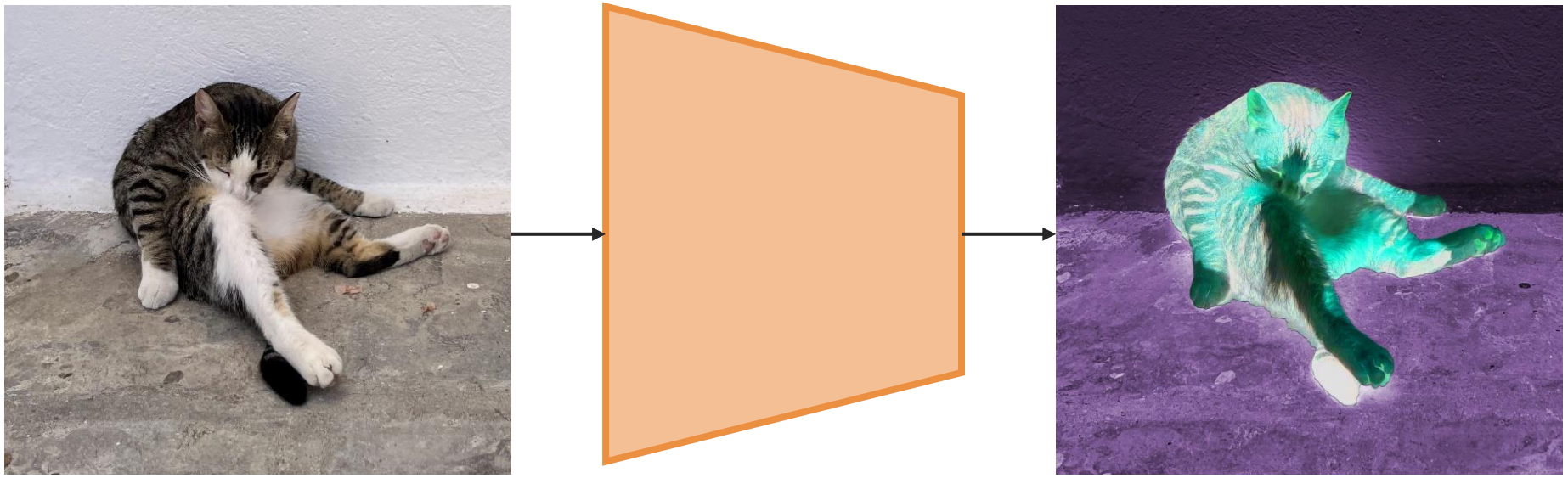
BigBiGAN



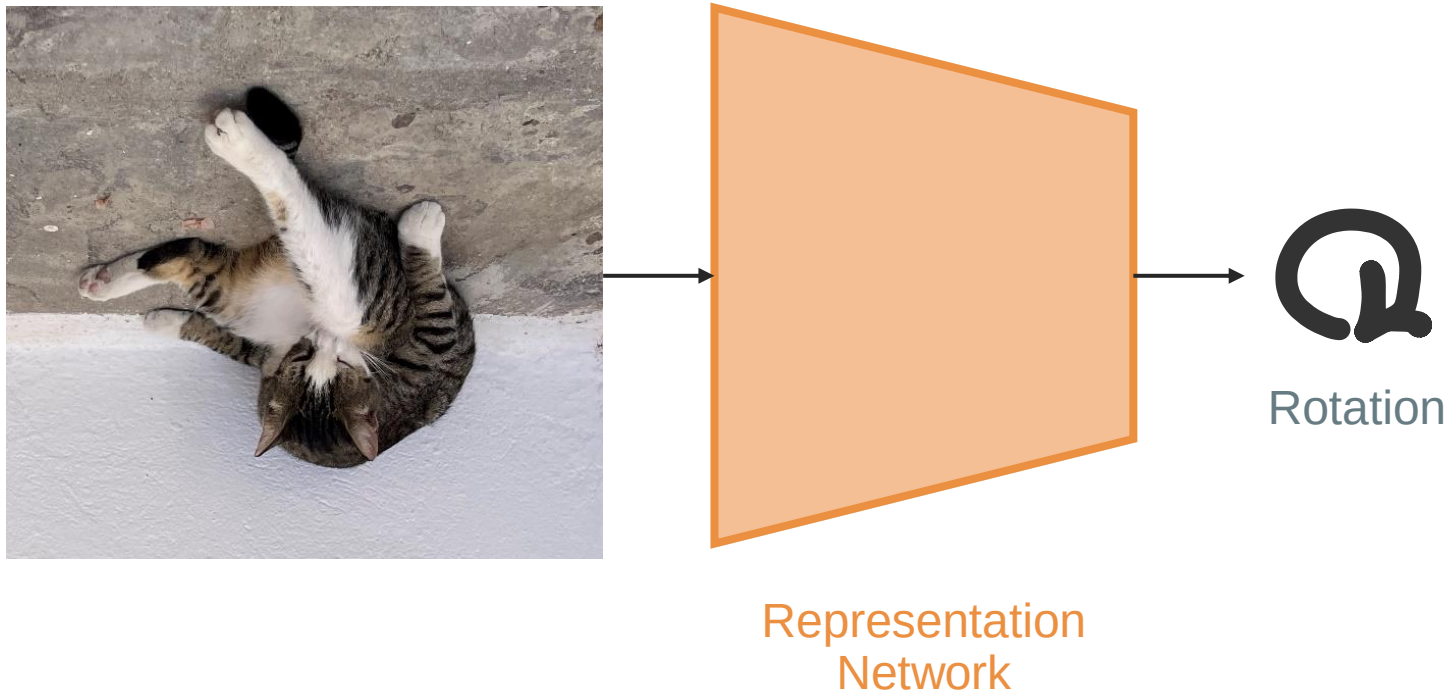
PyData Yerevan

August 13th, 2022

Generative Adversarial Networks: Colorization

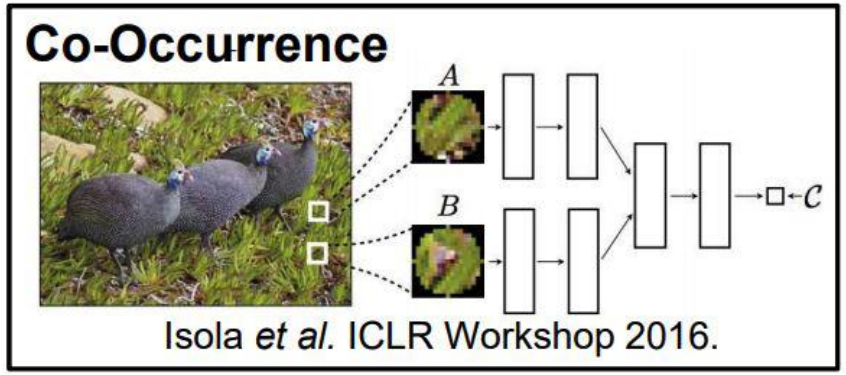


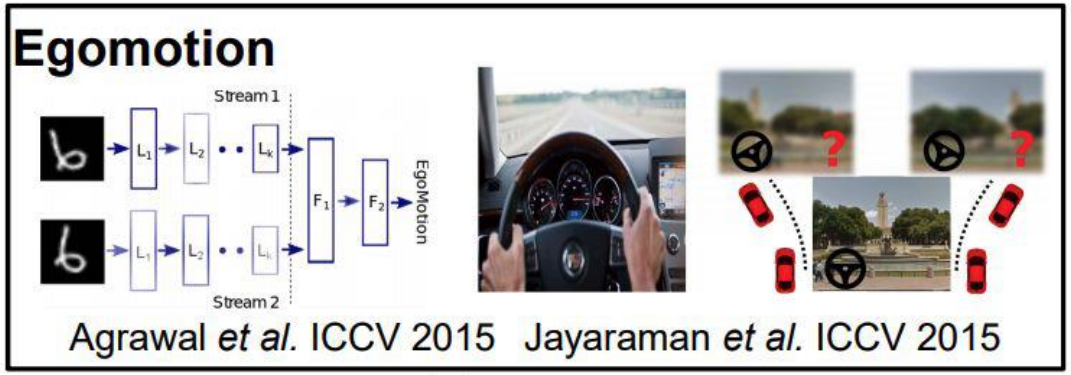
Generative Adversarial Networks: Rotation Prediction

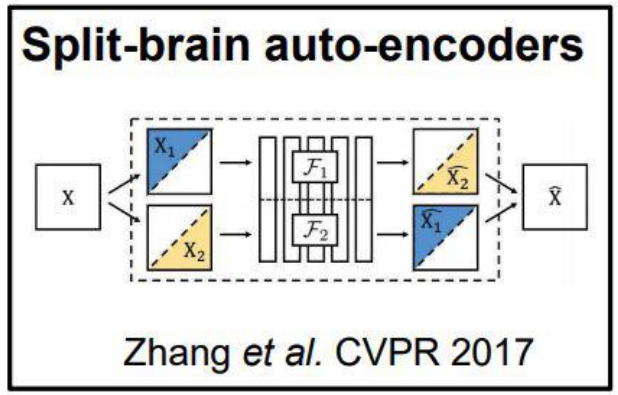


PyData
Yerevan
August 13th, 2022

Self-supervised learning



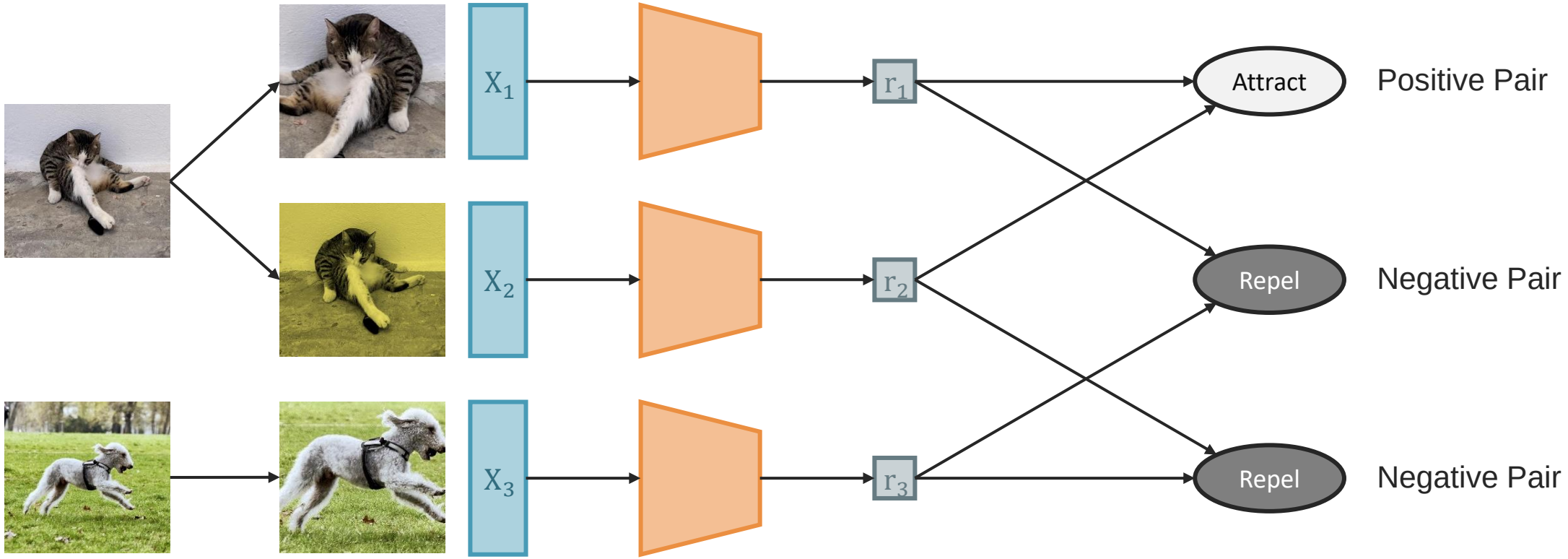




PyData Yerevan

August 13th, 2022

Contrastive learning



PyData Yerevan

August 13th, 2022

August 13th, 2022

August 13th, 2022

Merci, Obrigado, Tack , Thanks, متشكرم,
Gracias, Bedankt, धन्यवाद, σας ευχαριστώ,
Ողջույն, dziękuję, 谢谢, شكراً

PyData
Yerevan
August 13th, 2022