Realistic Image and Video Generation with Deep Neural Networks

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LTCI, Télécom Paris - Multimedia, Institut Polytechnique de Paris
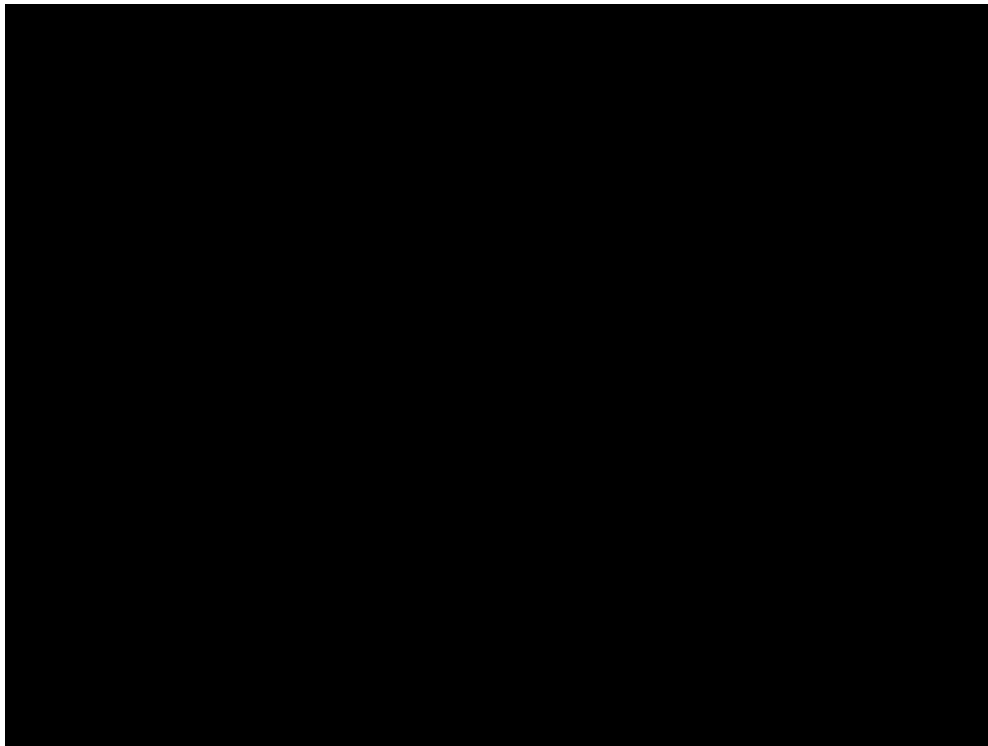
Who am I?

2014 — PhD (Ínria) — **Perception** Dr. R. Horaud — 2018 — Post-Doc (UNIVERSITÀ DI TRENTO) — **MHUG** Prof. Nicu Sebe — 2019 — Maître de conférences (TELECOM Paris / IP PARIS) — **Multimedia**
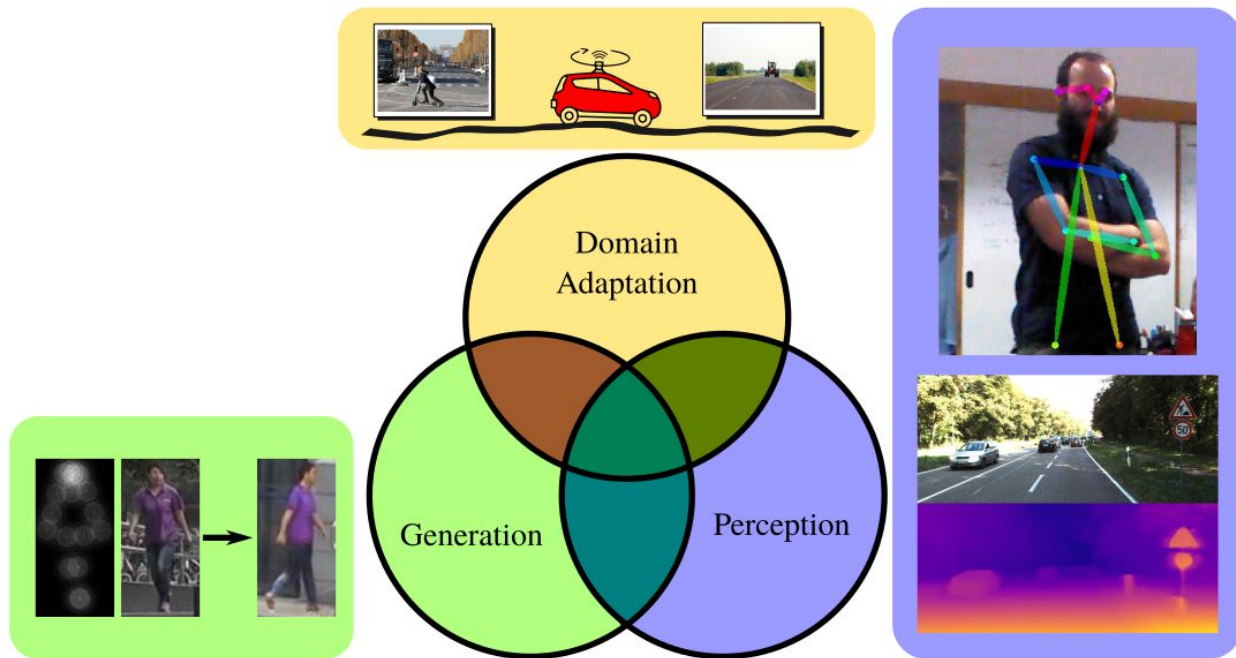
PhD with Radu:
- Deep Learning (1st Radu's student to joint the dark side of the force)
- Computer Vision (Regression problems)
- Multiperson Human-Robot Interaction (RL)

Who am I?

Who am I?

GAN for image and video generation

Images

Videos

Limitations:
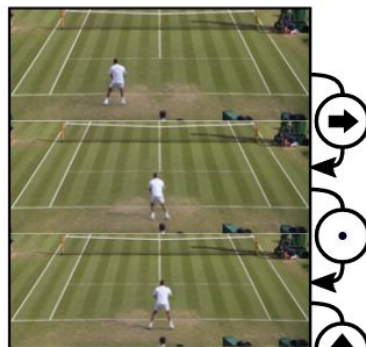- Require a large amount of training data
- No control on the generation process

Brock et al, Large Scale GAN Training for High Fidelity Natural Image Synthesis, ICLR 2018
AClark, Aidan, Jeff Donahue, and Karen Simonyan. "Efficient video generation on complex datasets." ArXiv preprint

Video generation: overview

Do-as-I-Do

Do-as-I-Say

Go-where-I-Click

Generation

Animating object from a single image

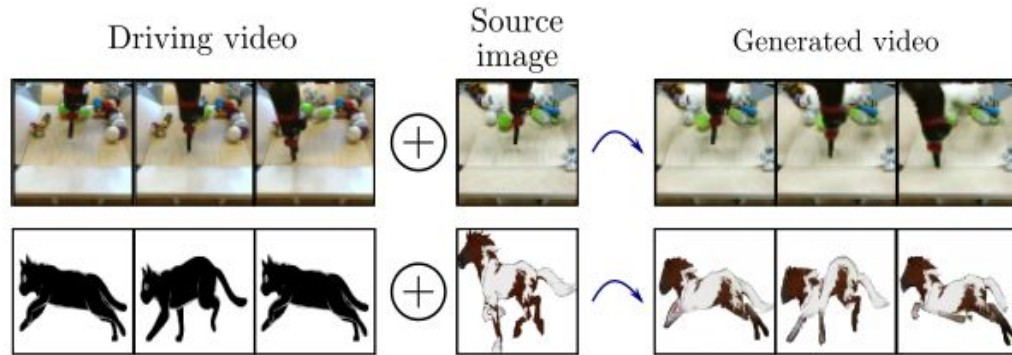Driving video + Source image → Generated video
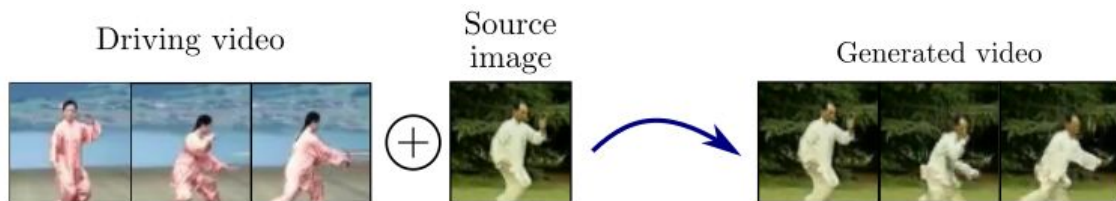
Naive solution: image-to-image translation

Source image + Driving video → Generated video
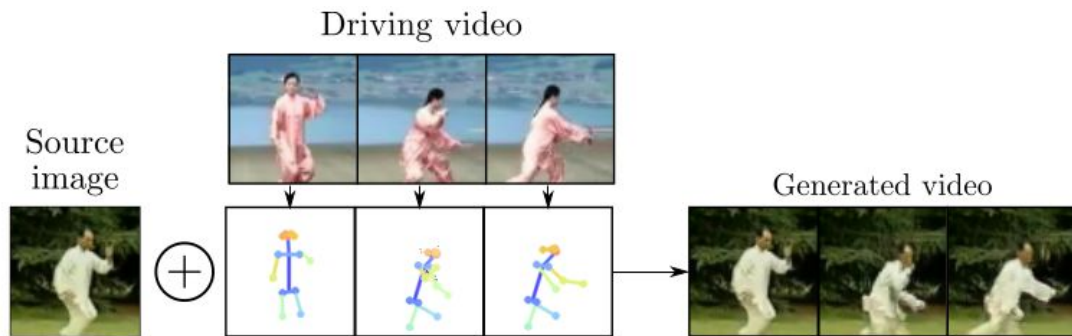
Animating object from a single image

Problem: It requires a detector

Driving video   Source image   Generated video

Solution: Self-supervised Motion Transfer

A. Siarohin, S. Lathuilière, S. Tulyakov , E. Ricci, N. Sebe, Animating Arbitrary Objects via Deep Motion Transfer , CVPR 2019
A. Siarohin, S. Lathuilière, S. Tulyakov , E. Ricci, N. Sebe, First Order Motion Model for Image Animation, Neurips 2019

Solution: Self-supervised Motion Transfer

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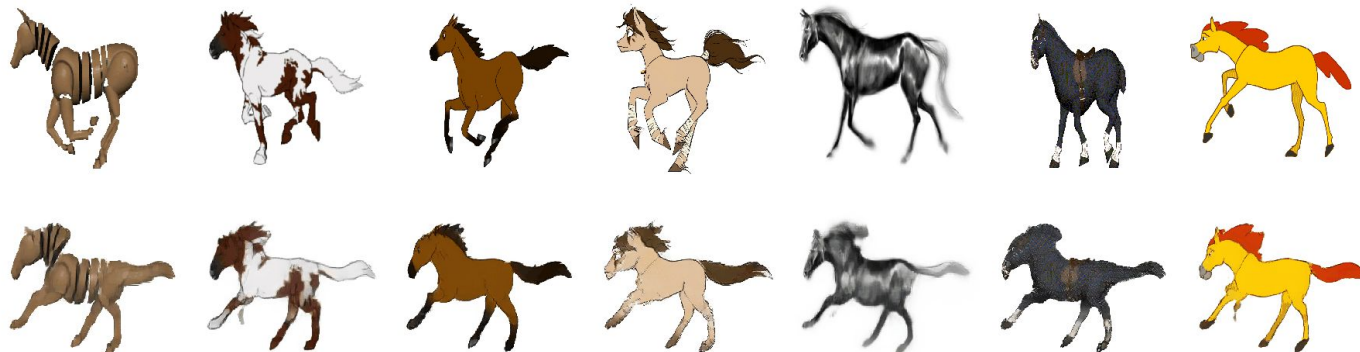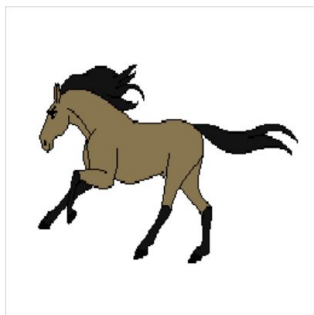A. Siarohin, S. Lathuilière, S. Tulyakov , E. Ricci, N. Sebe, First Order Motion Model for Image Animation, Neurips 2019

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Video available at: https://aliaksandrsiarohin.github.io/first-order-model-website/

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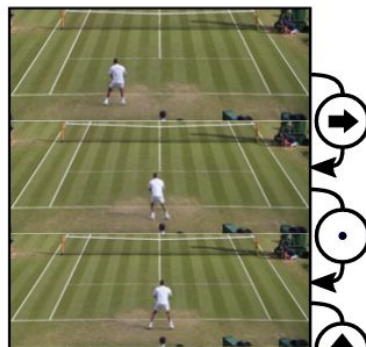
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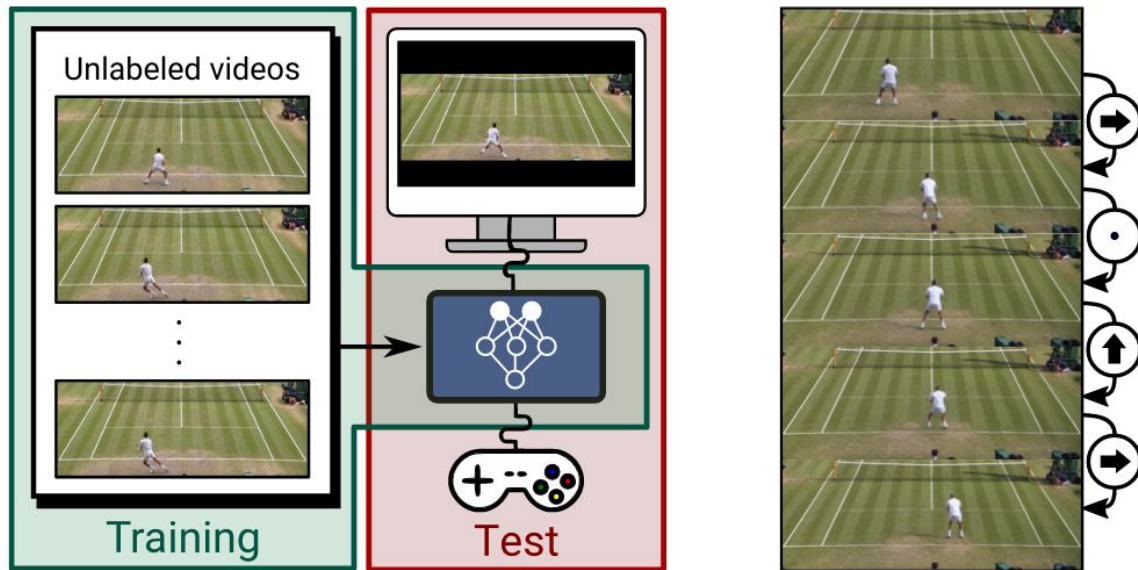# Video generation: overview
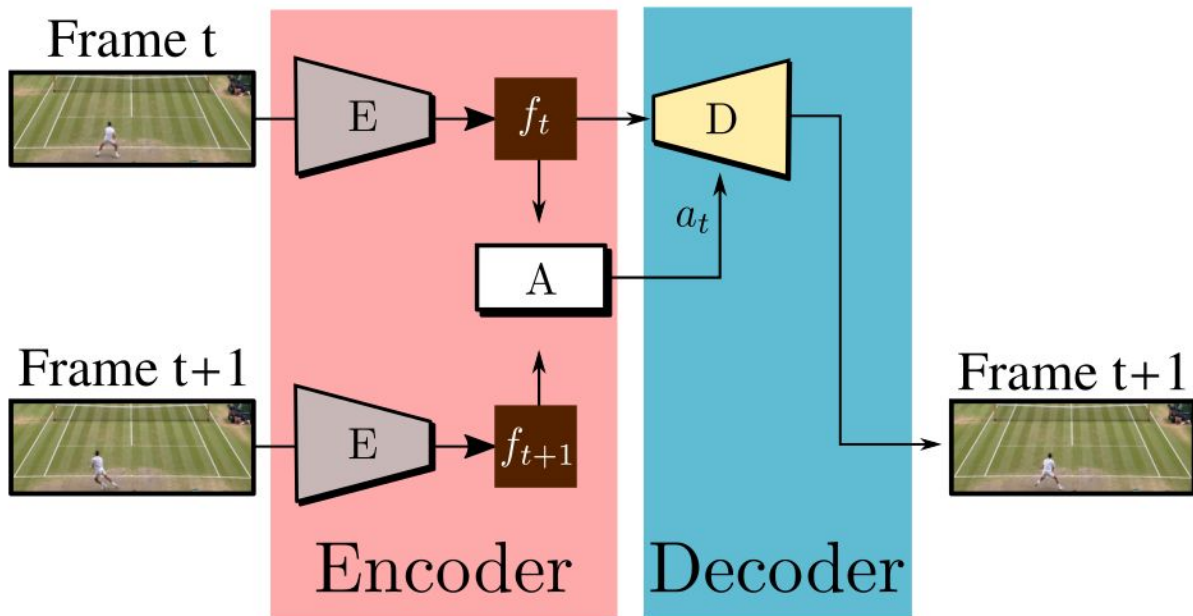
Do-as-I-Do

Do-as-I-Say
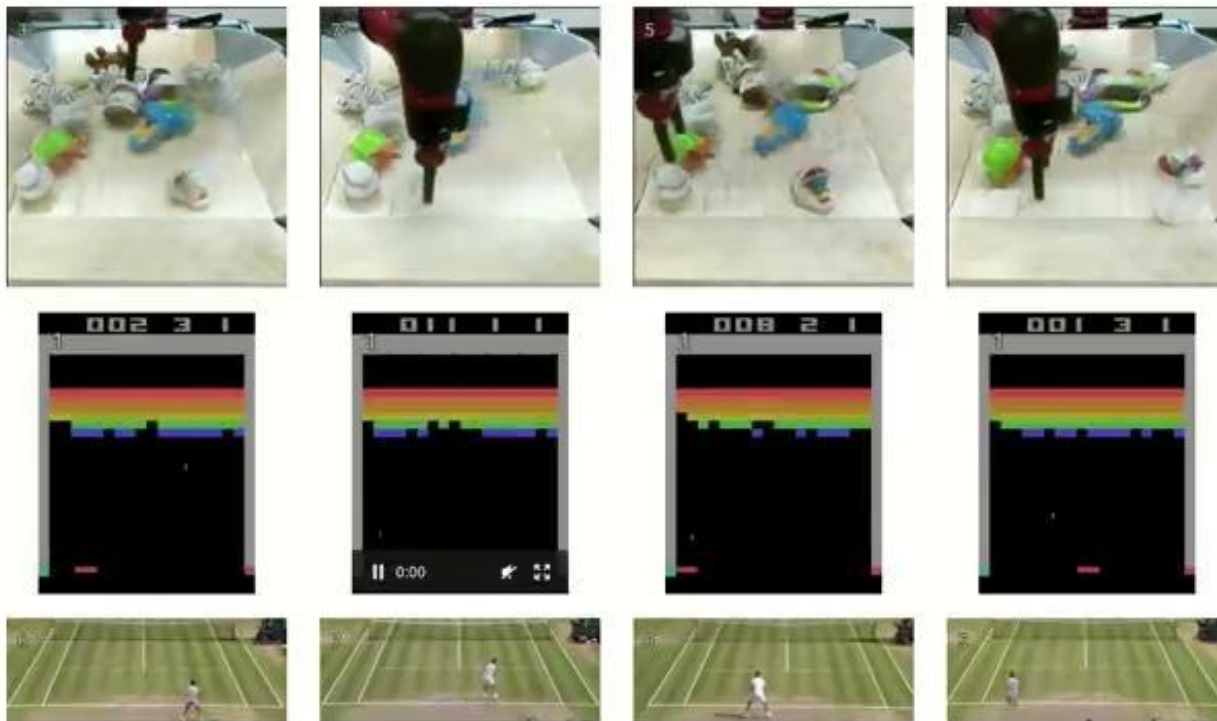
Go-where-I-Click

Generation

Conditional video generation: Do-as-I-Say

W. Menapace, S. Lathuilière, S. Tulyakov, A. Siarohin, E. Ricci, Playable Video Generation, CVPR 2021

Clustering for Action Decomposition and DiscoverY (CADDY).

W. Menapace, S. Lathuilière, S. Tulyakov, A. Siarohin, E. Ricci, Playable Video Generation, CVPR 2021

Clustering for Action Decomposition and DiscoverY (CADDY).

Conclusion