Welcome to the School on generative models!

V3.0 Hybrid Edition

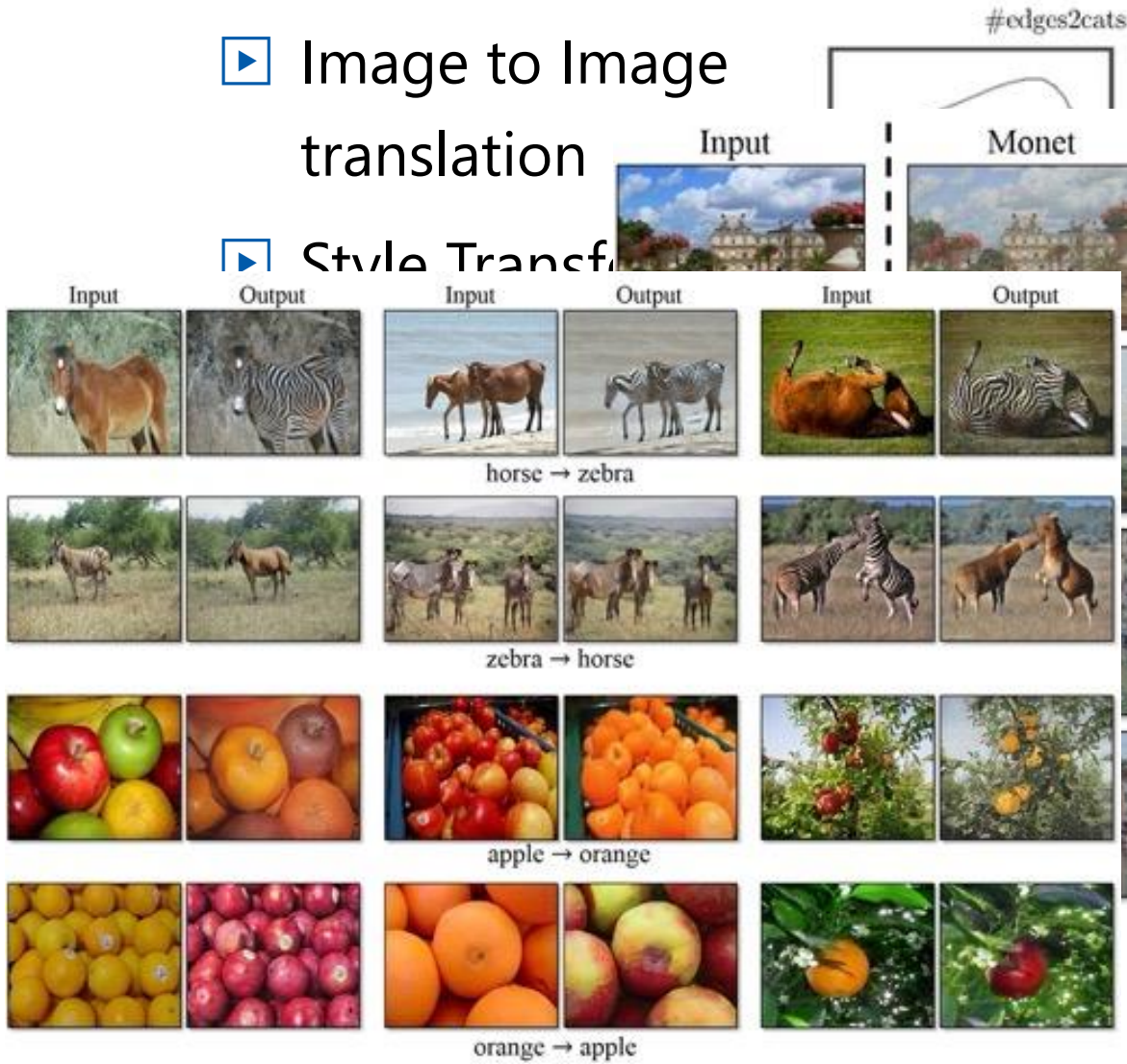
2021, November 23-26

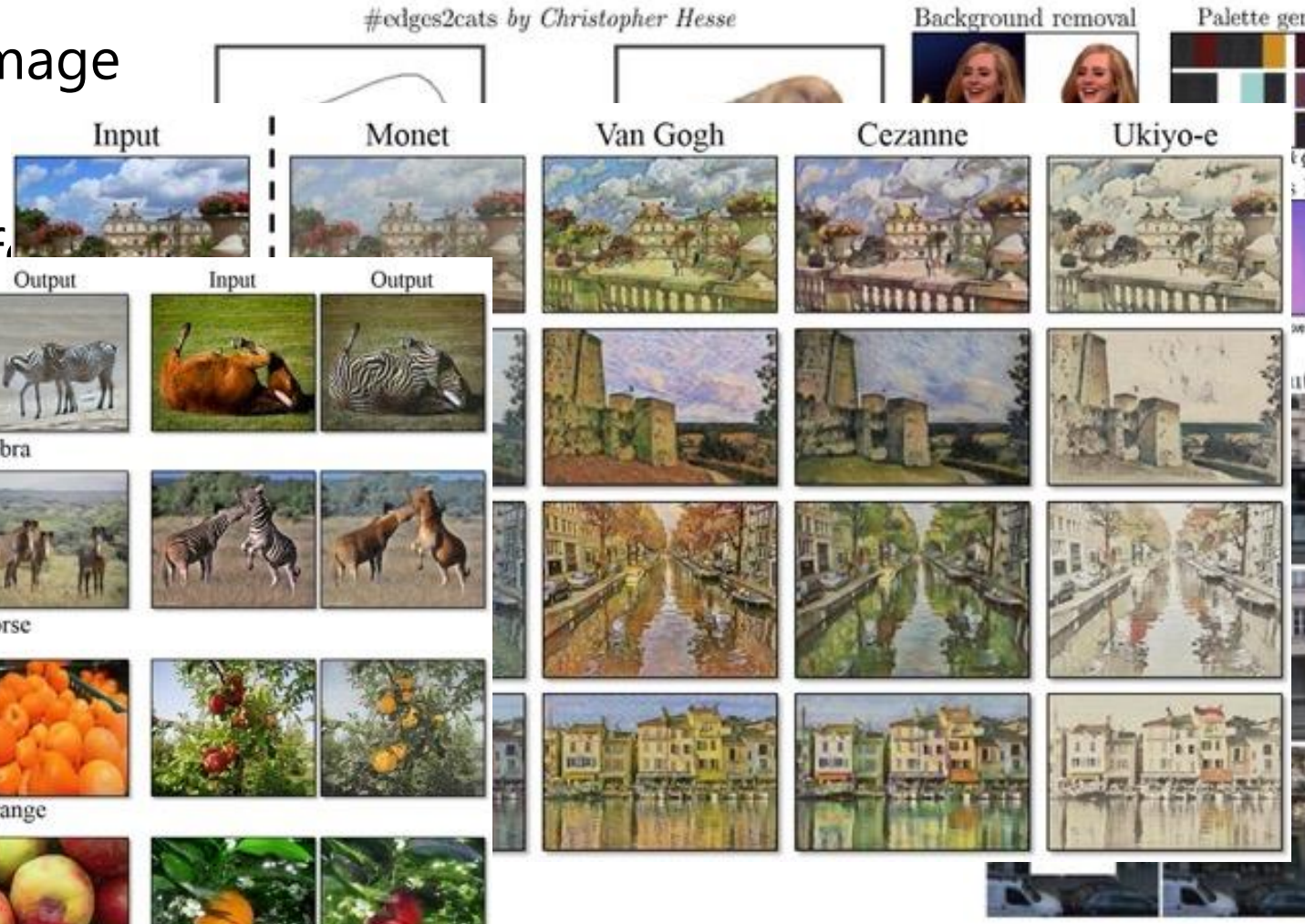
Andrey Ustyuzhanin

YSDA

Generative models basic examples

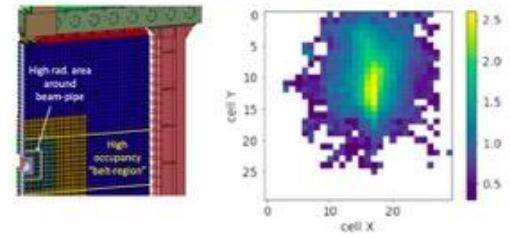
- Image to Image translation
- Style Transf



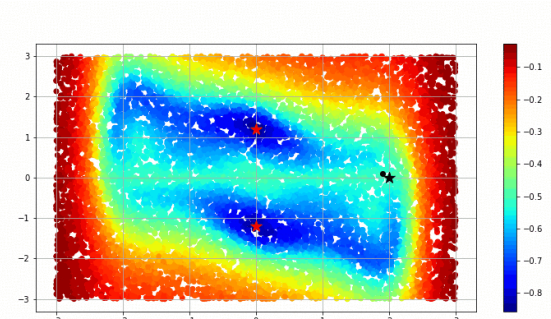


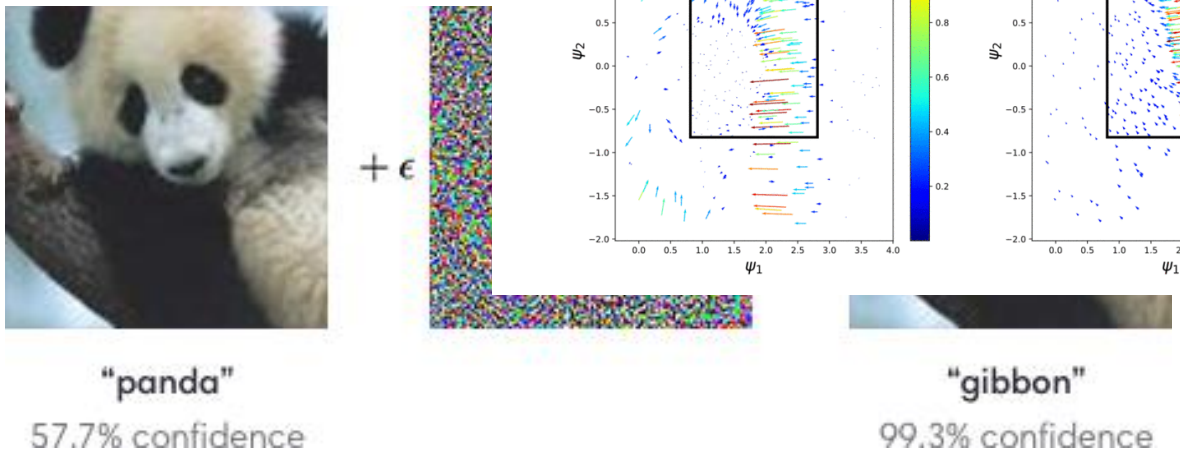
Advanced examples

- Adversarial train
- Fast simulation
- Black-box optim
- Anomaly detect

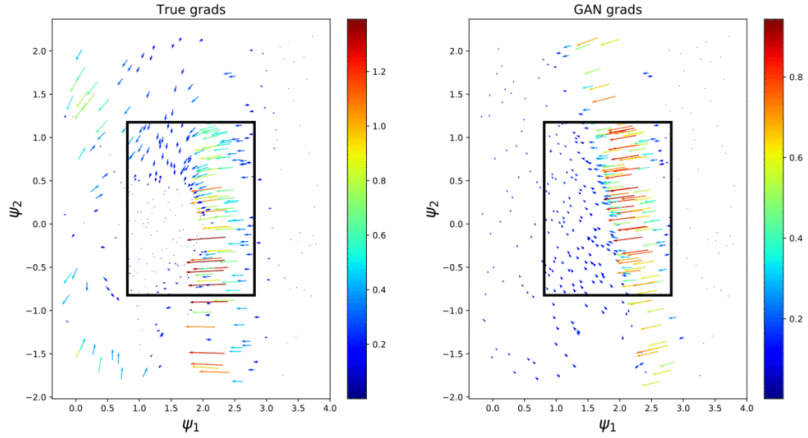


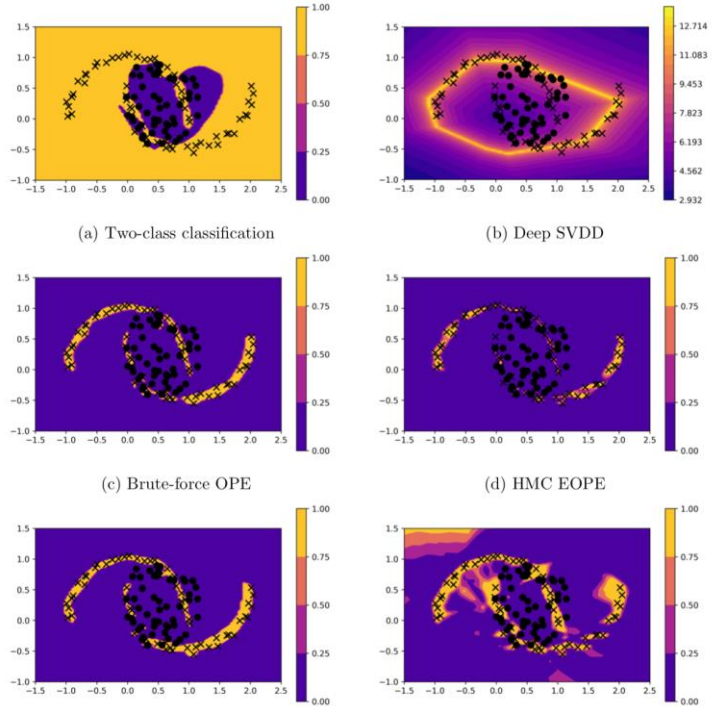
, https://doi.org/10.1051/epjconf/201921402034





https://openai.com/blog/adversarial-example-research/





https://arxiv.org/abs/1906.06096

School Idea

- From introductory metrics to the cutting-edge generative models
  - Mathematical foundations;
  - From basics to advanced models;
  - Hands-on tutorials;
  - Real life examples;
  - Socialization and Networking.

Main agenda topics

- Introduction into generative models (Tue)
  - Metrics, Generative Adversarial Networks
- Diffusion models (Wed)
- Advanced sampling techniques (Thu)
- Generative model applications (Fri)

Timetable: https://indico.cern.ch/event/1082512/timetable/

Яндекс

ШКОЛА · ЭКОНОМИКИ · ВЫСШАЯ

HSE Faculty of Computer Science

- Established in March 2014,
- Active support from industry: Yandex (more than 50 lecturers/seminarists are Yandex employees), Kaspersky, WorldQuant, Huawei, SAS, JetBrains, and other
- Goal: enter the world's top 30 Computer Science faculties by 2022
  - big data storing and processing,
  - software development and system programming,
  - machine learning
- ~400 students enter bachelor program every year
- ~100 graduate master's program every year
- Member of LHCb collaboration since June 2018
- Collaborates with many European and US universities

Laboratory of Methods for Big Data Analysis

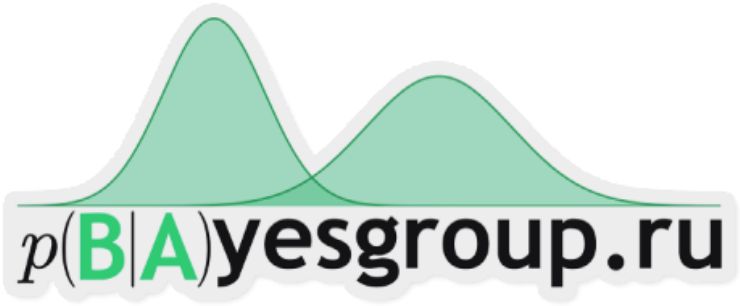
- Development and application of ML methods and tools to Natural science challenges
- Close partnership with Yandex School of Data Analysis
- Collaborates with LHCb, SHiP, OPERA, NEWSdm experiments
- Research Project examples:
  - Storage/Speed optimization for LHCb triggers;
  - Particle Identification algorithms;
  - Optimization of detector;
  - Event simulation speed-up.
- Co-organization of ML challenges: Flavours of Physics, TrackML
- *Open for interns, graduate students and post doc candidates!*

LAMBDA • HSE

hse_lambda

Bayes Group by Dmitry Vetrov

- Mathematic foundation of Deep learning
  - stochastic optimization
  - tensor decompositions
  - scalable variational inference
- Applied projects
  - text processing
  - computer vision
  - software code analysis
- Partners:
  - Samsung, Yandex, NVIDIA, Kasperskylab, Sberbank, Schlumberger, JetBrains



https://bayesgroup.ru/

HDI Laboratory

- The **International Laboratory of Stochastic Algorithms and High-Dimensional Inference (HDI Lab)**
- We work at the intersection of numerous mathematical disciplines: modern statistics, optimization, probability theory, numerical mathematics, etc.
- Goal: development and analysis of new efficient computational statistical algorithms for high-dimensional and challenging statistical problems:
  - Uncertainty quantification in machine learning algorithms (incl. MCMC, RL, Gen. models, DL)
  - Mathematical foundations of Reinforcement learning
  - Convex and non-convex optimization
  - Manifold learning
  - Optimal transport
  - Inference for stochastic processes and SDEs
  - Non-asymptotic analysis of high-dimensional random matrices and random graphs
  - **Effecient Sampling**

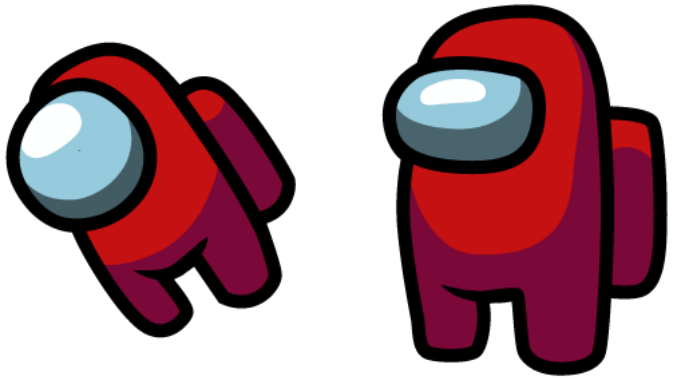
https://cs.hse.ru/hdilab/

Prof. Eric Moulines
(Ecole Polytechnique)

Prof. Alexey Naumov
HSE University

Social activities

- Suggested Activities:
  - Random coffee
  - Dinner for ‘offline’ participants on 26th of Nov
  - What else?
- Communication channels:
  - Zoom for interactive classes (lectures, seminars)
  - Telegram for Q&A, technical assistance, social activities: https://t.me/joinchat/yCZSUL9KkDVjMDBi



Thank you!

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School Partners