MACHINE LEARNING & DATA ANALYTICS

FRIEDRICH-ALEXANDER UNIVERSITÄT ERLANGEN-NÜRNBERG

FACULTY OF ENGINEERING

Increasing stability for GAN training using past exploration

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May 27th, 2020

Motivation

Machine Learning applications require **data**

Solutions:

Data argumentation

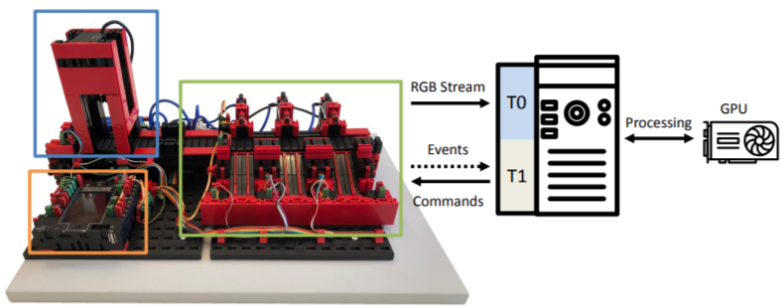
Synthetic images

Figure 1. Does this person exist? by Philip Wang, 2020, retrieved from https://thispersondoesnotexist.com/

Use Case: Demo Sorting Machine

real-time rgb-based **sorting system**

detect objects on the conveyer



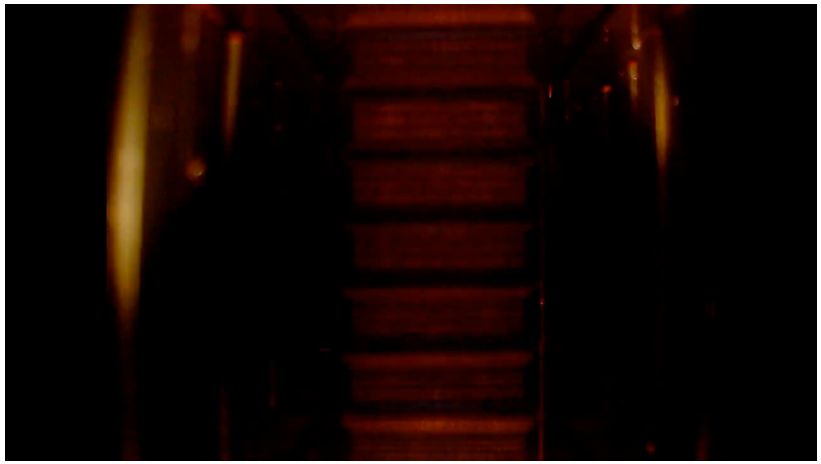


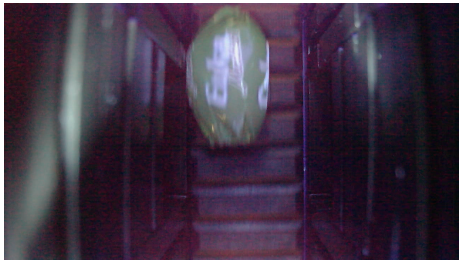
Figure 2. Demo Sorting Machine by Franz Köferl, 2020, retrieved from https://www.tensorflow.org/tutorials/generative/dcgan

Use Case: Demo Sorting Machine

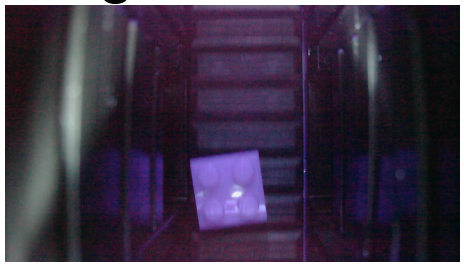
Heads

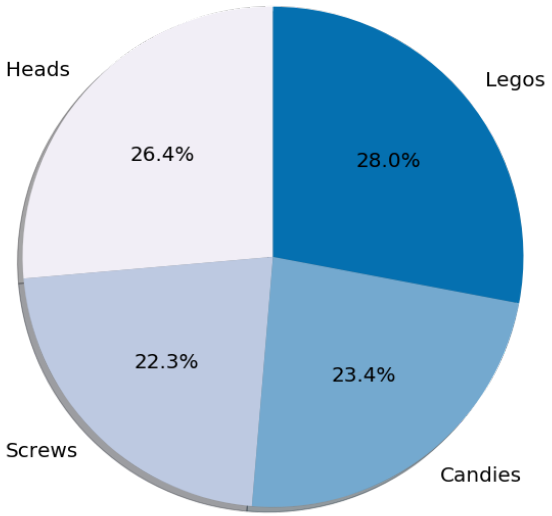
Screws

Candies



Legos





Problem Statement

In order to get more training data we use:

Generative Adversarial Networks

Figure 4. From Unsplash by James Day retrieved from https://unsplash.com/photos/5YWf-5hyZcw

Method

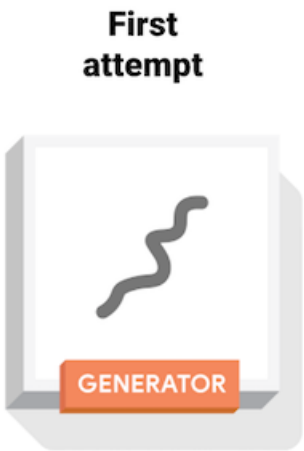


Figure 5. What are GANs? by TensorFlow Tutorials, 2020, retrieved from https://www.tensorflow.org/tutorials/generative/dcgan

Literature Research

Improved Techniques for Training GANs

Tim Salimans tim@openai.com
Ian Goodfellow ian@openai.com
Wojciech Zaremba woj@openai.com
Vicki Cheung vicki@openai.com
Alec Radford alec.radford@gmail.com
Xi Chen peter@openai.com

NIPS 2016 Tutorial:
Generative Adversarial Networks

Ian Goodfellow

OpenAI, ian@openai.com

TOWARDS PRINCIPLED METHODS FOR TRAINING GENERATIVE ADVERSARIAL NETWORKS

Martin Arjovsky
Courant Institute of Mathematical Sciences
martinarjovsky@gmail.com

Léon Bottou
Facebook AI Research
leonb@fb.com

Figure 6. Improved Techniques for Training GANs by Goodfellow, 2020, retrieved from https://arxiv.org/pdf/1606.03498.pdf
Figure 7. NIPS 2016 Tutorial: Generative Adversarial Network by Goodfellow, 2017, retrieved from https://arxiv.org/pdf/1701.00160v3.pdf
Figure 8. Towards principled Methods for Training Generative Adversarial Networks by Martin Arjovsky retrieved from https://arxiv.org/pdf/1701.04862.pdf
Figure 9. From Unsplash by James Day retrieved from https://unsplash.com/photos/5YWf-5hyZcw

Ways to improve GANs performance

Historical Averaging – penalize models which are different from the historical average

Experience replay – feed the discriminator with all recent generated images

Using labels – any extra help in guiding the GAN training can improve the performance a lot

Figure 9. From Unsplash by James Day retrieved from https://unsplash.com/photos/5YWf-5hyZcw

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Thanks for your attention!