

Introduction to Diffusion Models

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Text prompt for generated image: *“Squirrel Lord of the Sith”*

Why are these models worth our attention?

Mainly because they are state-of-the-art generative models.

That's why

1. If you need to use generative model in you task, you probably should choose diffusion one.
2. If you do a research in the realm of generative modeling, you are highly recommended to be familiar with these models.
3. If you are looking for math in Deep Learning, you can find it here ;)



Text prompt for generated image: *"hedgehog in the fog... from hookah"*

Cool images is all you need!

Diffusion Models become so popular due to their good capability of generating images / video / audio given text.



a parade of fantastic planets,
broccoli worlds, space, a grandiose
cosmic landscape

Creep funny bug-eyed giraffe
hamster



The cat dives into the pool like a
child on the cover of the Nevermind
album, realistic

You can generate such fancy image by yourself!

1. Diffusion Model from Yandex

<https://shdevrum.ai>

2. Diffusion Model from StabilityAI

<https://stablediffusionweb.com/#ai-image-generator>

3. Diffusion Model from Midjourney

<https://discord.com/invite/midjourney>

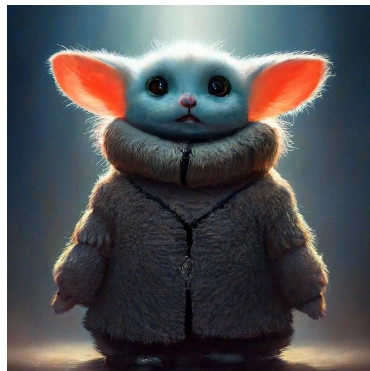
Purpose of this course

The main goal of this course is to help you to understand how Diffusion Models work under the hood.

Why one may need it?

Having this understanding you will be able to

- freely read relevant papers digging further into the topic
- adjust current Diffusion Models so they more properly satisfy your needs



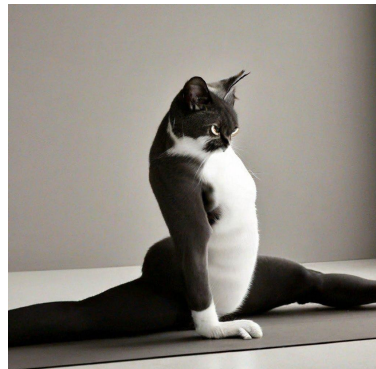
Text prompt for generated image: *“the mandalorian hamster”*

Plan of this course

1. Diffusion Models basics
2. Techniques for faster sampling
3. Classifier-free guidance
(technique for generation wrt given label)
4. “SoTA” generative model architectures
 - a. Stable Diffusion
 - b. Imagen

*These topics will be accompanied
by coding.*

*Here we will probably just load
pretrained Latent Diffusion Model
and play with it for a little bit.*



Text prompt for generated image: “*Cat does yoga*”

Assessment

1. One homework (actually, will be solved during classes together)
2. Quiz covering main topics of the course at the last lecture

Text prompt for generated image: *“a kitten sits on the moon and looks at the Earth”*

