

Advanced machine learning and data analysis for the physical sciences

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Imports and Utilities

```
import torch
import torch.nn as nn
import torch.nn.functional as F
from torchvision import datasets, transforms
from torch.utils.data import DataLoader
import matplotlib.pyplot as plt
import math
```

```
device = 'cuda' if torch.cuda.is_available() else 'cpu'
```

```
# Training settings
```

```
batch_size = 128
```

```
epochs      = 5
```

```
lr          = 2e-4
```

```
img_size    = 28
```

```
channels     = 1
```

```
# Diffusion hyperparameters
```

```
T = 300 # number of diffusion steps [oai_citation:5†Medium](https://
```

```
beta_start, beta_end = 1e-4, 0.02
```

```
betas = torch.linspace(beta_start, beta_end, T, device=device) # line
```

```
alphas = 1. - betas
```

```
alphas_cumprod = torch.cumprod(alphas, dim=0)
```

```
transform = transforms.Compose([
    transforms.ToTensor(),
    transforms.Normalize((0.5,), (0.5,)),
])
```