README.md

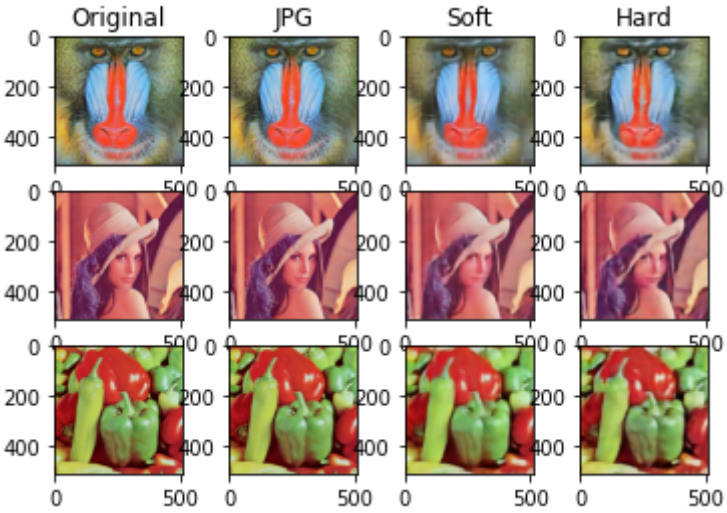
AutoCompressor

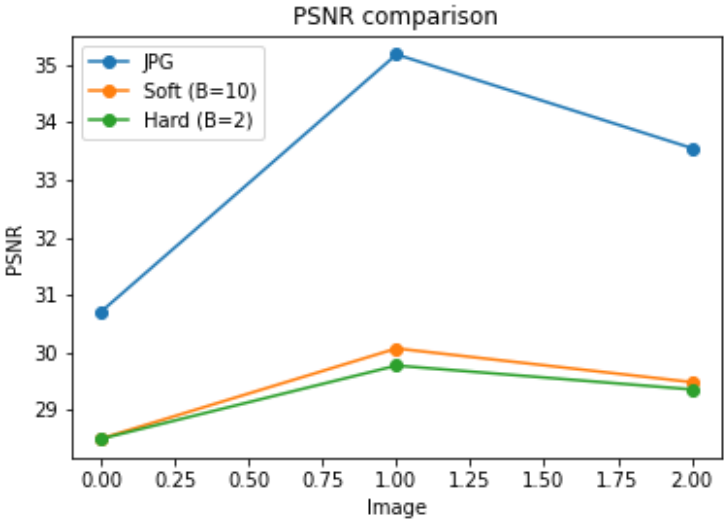
@author Бобров Олег Борисович, группа M4150

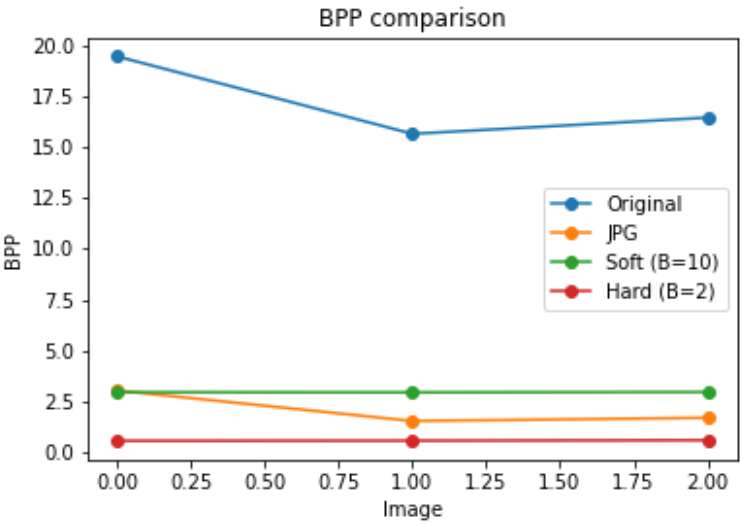
This repository contains source code for neural compressor. Model was build using **autoencoder** architecture. For encoder part pretrained ResNet18 was used. Decoder is mirrored representation of encoder with upsampling layers.

Latent vector obtained after encoding part is quantized (hard mode with B = 2 and sof mode with B = 10) and then encoded using adaptive arithmetic encoding.

Below you can find charts of BPP and PSNR comparison between JPG, AE(B=2) and AE(B=10) algorithms on three test images.


Original
JPG
Soft
Hard
0
200
400
500


PSNR comparison
JPG
Soft (B=10)
Hard (B=2)
PSNR
Image
35
34
33
32
31
30
29
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00



As we can see, PSNR is similar on both soft and hard encoding. Both models perform worse than JPG in terms of PSNR. Nevertheless, AE(B=2) has much lower BPP which can be used for storage efficiency in some cases.

Below you can see usage example for coding and decoding. 3 test images were encoded with these commands. You can run them all using test_all.sh

Training

Autoencoders were trained using 130k Images (512x512) - Universal Image Embeddings dataset. MSE loss was used in both cases. You can find training notebook here.

Weights

You can download trained weights from Google Drive

Encoding

Soft (B = 10)

```
 python3 encode.py --
input_path=resources/test_images/peppers.png --
output_path=resources/encoded/B=10/peppers.encoded
--encoder_path=models/model_B=10/encoder.model --
quantize_mode=soft
```

```
 python3 encode.py --
input_path=resources/test_images/lena.png --
output_path=resources/encoded/B=10/lena.encoded --
encoder_path=models/model_B=10/encoder.model --
quantize_mode=soft
```

```
 python3 encode.py --
input_path=resources/test_images/baboon.png --
output_path=resources/encoded/B=10/baboon.encoded -
-encoder_path=models/model_B=10/encoder.model  --
quantize_mode=soft
```

Hard (B = 2)

```
 python3 encode.py --
input_path=resources/test_images/peppers.png --
output_path=resources/encoded/B=2/peppers.encoded -
-encoder_path=models/model_B=2/encoder.model --
quantize_mode=hard

 python3 encode.py --
input_path=resources/test_images/lena.png --
output_path=resources/encoded/B=2/lena.encoded --
encoder_path=models/model_B=2/encoder.model --
quantize_mode=hard

 python3 encode.py --
input_path=resources/test_images/baboon.png --
output_path=resources/encoded/B=2/baboon.encoded --
encoder_path=models/model_B=2/encoder.model  --
quantize_mode=hard
```

Decoding

Soft (B = 10)

```
 python3 decode.py --
output_path=resources/results/B=8/peppers_reconstru
cted.png --
input_path=resources/encoded/B=10/peppers.encoded -
-decoder_path=models/model_B=10/decoder.model --
quantize_mode=soft
```

```
 python3 decode.py --
output_path=resources/results/B=8/lena_reconstructe
d.png --
input_path=resources/encoded/B=10/lena.encoded --
decoder_path=models/model_B=10/decoder.model --
quantize_mode=soft

 python3 decode.py --
output_path=resources/results/B=8/baboon_reconstruc
ted.png --
input_path=resources/encoded/B=10/baboon.encoded --
decoder_path=models/model_B=10/decoder.model --
quantize_mode=soft
```

Hard (B = 2)

```
 python3 decode.py --
output_path=resources/results/B=2/peppers_reconstru
cted.png --
input_path=resources/encoded/B=2/peppers.encoded --
decoder_path=models/model_B=2/decoder.model --
quantize_mode=hard

 python3 decode.py --
output_path=resources/results/B=2/lena_reconstructe
d.png --
input_path=resources/encoded/B=2/lena.encoded --
decoder_path=models/model_B=2/decoder.model --
quantize_mode=hard
```

```
 python3 decode.py --
output_path=resources/results/B=2/baboon_reconstruc
ted.png --
input_path=resources/encoded/B=2/baboon.encoded --
decoder_path=models/model_B=2/decoder.model --
quantize_mode=hard
```