

# Lab Image Colorization

Hugo Matousek

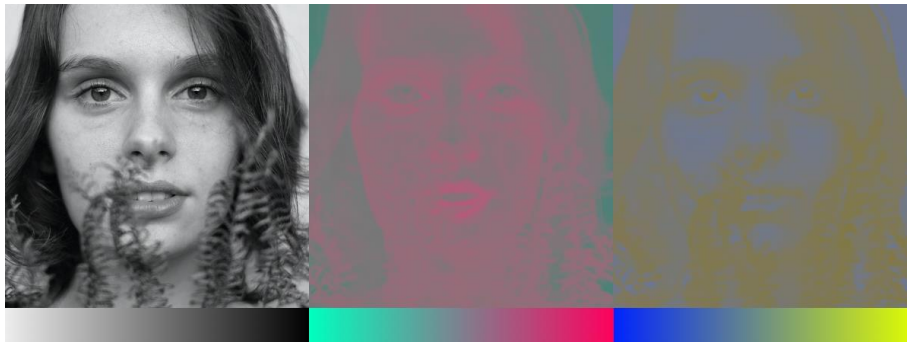
AIT Budapest Deep Learning S2022

# Idea and Previous Solutions

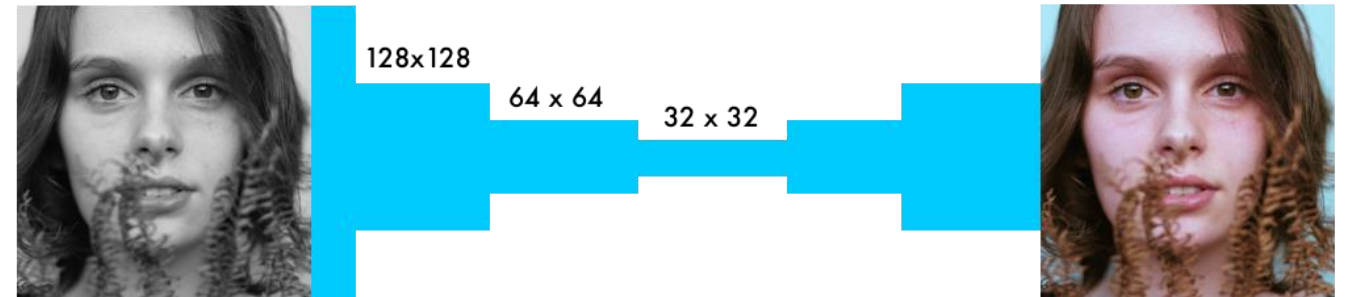
$$f \left( \begin{array}{|c|c|c|c|c|} \hline 93 & 92 & 83 & 77 & 77 \\ \hline 92 & 77 & 77 & 77 & 92 \\ \hline 92 & 77 & 83 & 77 & 92 \\ \hline 77 & 77 & 77 & 92 & 92 \\ \hline 77 & 77 & 92 & 92 & 92 \\ \hline \end{array} \right) = \begin{array}{|c|c|c|c|c|} \hline 83 & 92 & 83 & 77 & 77 \\ \hline 99 & 99 & 77 & 77 & 92 \\ \hline 99 & 77 & 83 & 77 & 92 \\ \hline 77 & 77 & 77 & 95 & 92 \\ \hline 77 & 77 & 95 & 92 & 92 \\ \hline \end{array} \begin{array}{|c|c|c|c|c|} \hline 93 & 92 & 83 & 69 & 69 \\ \hline 92 & 69 & 69 & 77 & 92 \\ \hline 92 & 69 & 83 & 77 & 92 \\ \hline 69 & 69 & 77 & 92 & 92 \\ \hline 77 & 77 & 92 & 92 & 92 \\ \hline \end{array} \begin{array}{|c|c|c|c|c|} \hline 83 & 92 & 83 & 77 & 77 \\ \hline 83 & 77 & 77 & 77 & 92 \\ \hline 92 & 77 & 83 & 75 & 85 \\ \hline 75 & 77 & 75 & 85 & 85 \\ \hline 75 & 75 & 85 & 85 & 85 \\ \hline \end{array} \quad [1]$$

- Simple 2D convolutional autoencoder
- Guiding the neural network by manually adding small dots of color
- Transfer coloring from a similar image
- Using residual encoder and merging classification layers
- Using hypercolumns from classifying network
- Infusing the autoencoder with the outcome of classifying the network

# My approach and models



256x256



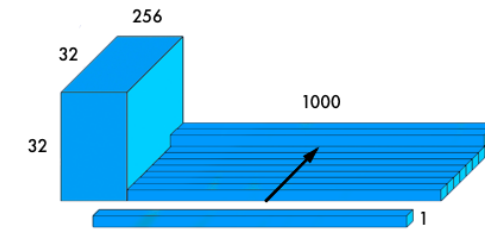
$$f \left( \begin{matrix} L \\ \begin{matrix} 93 & 92 & 83 & 77 & 77 \\ 92 & 77 & 77 & 77 & 92 \\ 92 & 77 & 83 & 77 & 92 \\ 77 & 77 & 77 & 92 & 92 \\ 77 & 77 & 92 & 92 & 92 \end{matrix} \end{matrix} \right) = \begin{matrix} a \\ \begin{matrix} .99 & .99 & .99 & .52 & .52 \\ .99 & .52 & .52 & .34 & .20 \\ .99 & .52 & .52 & .20 & .83 \\ .52 & .52 & .20 & .83 & .83 \\ .83 & .83 & .83 & .83 & .83 \end{matrix} \end{matrix} \begin{matrix} b \\ \begin{matrix} .88 & .88 & .60 & .52 & .71 \\ .88 & .60 & .52 & .52 & .71 \\ .60 & .52 & .52 & .20 & .71 \\ .60 & .52 & .20 & .83 & .83 \\ .52 & .20 & .83 & .83 & .83 \end{matrix} \end{matrix}$$

0 to 100      -128 to 128      -128 to 128

Encoder

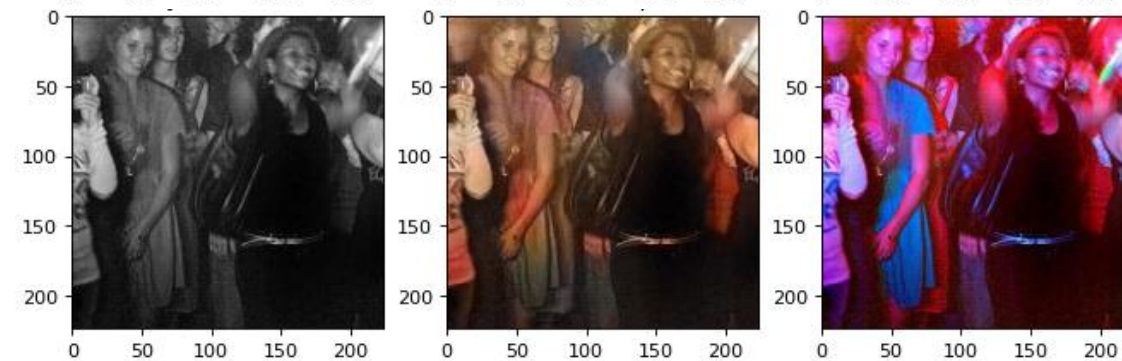
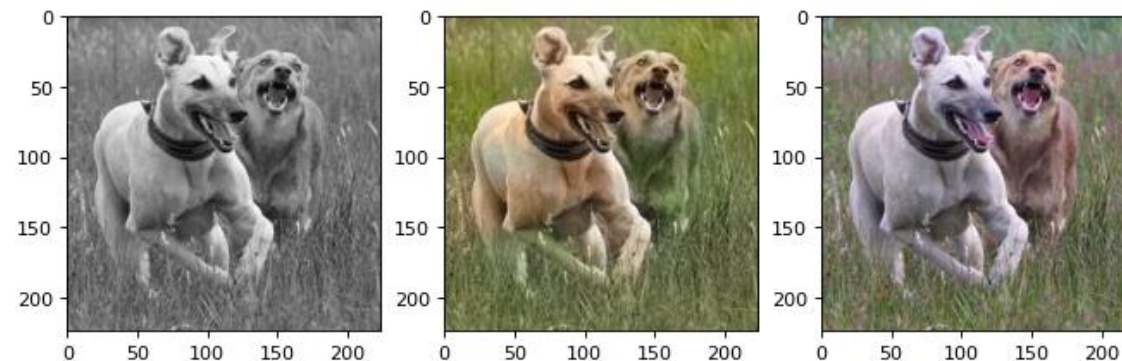
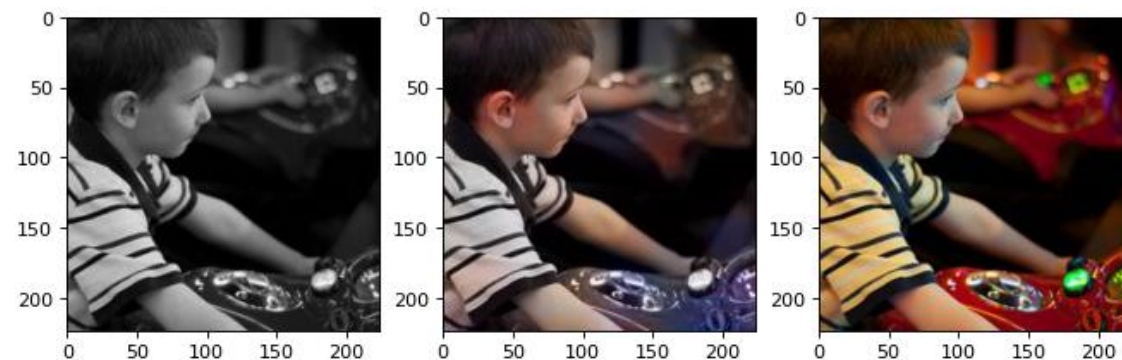
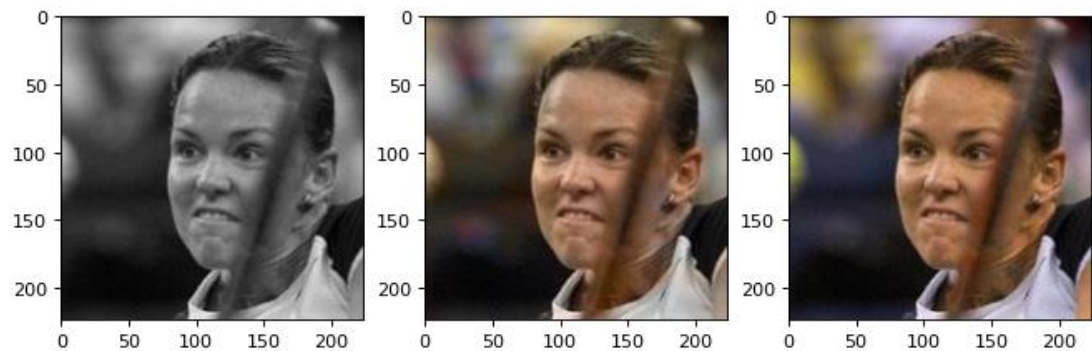
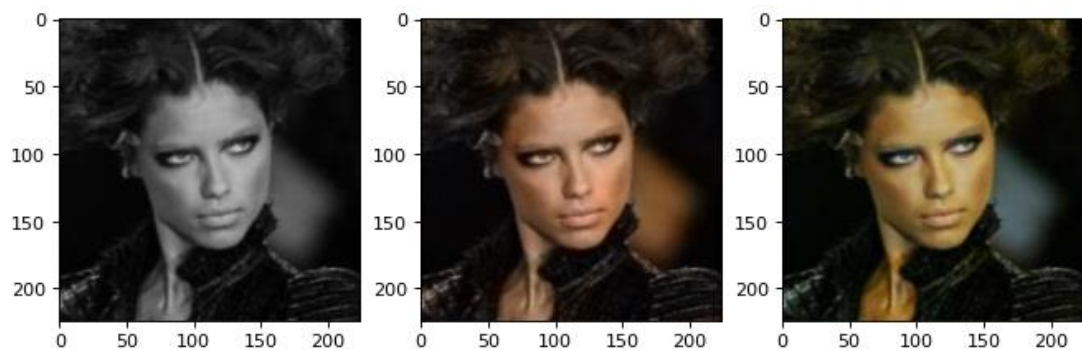
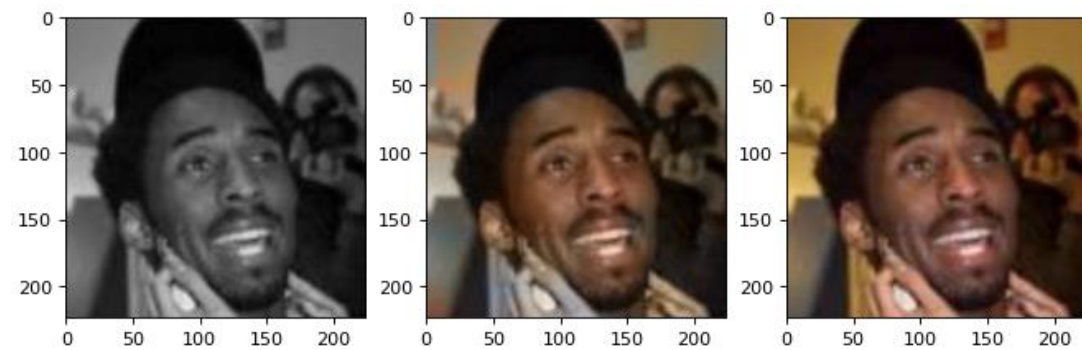


Inception Resnet V2



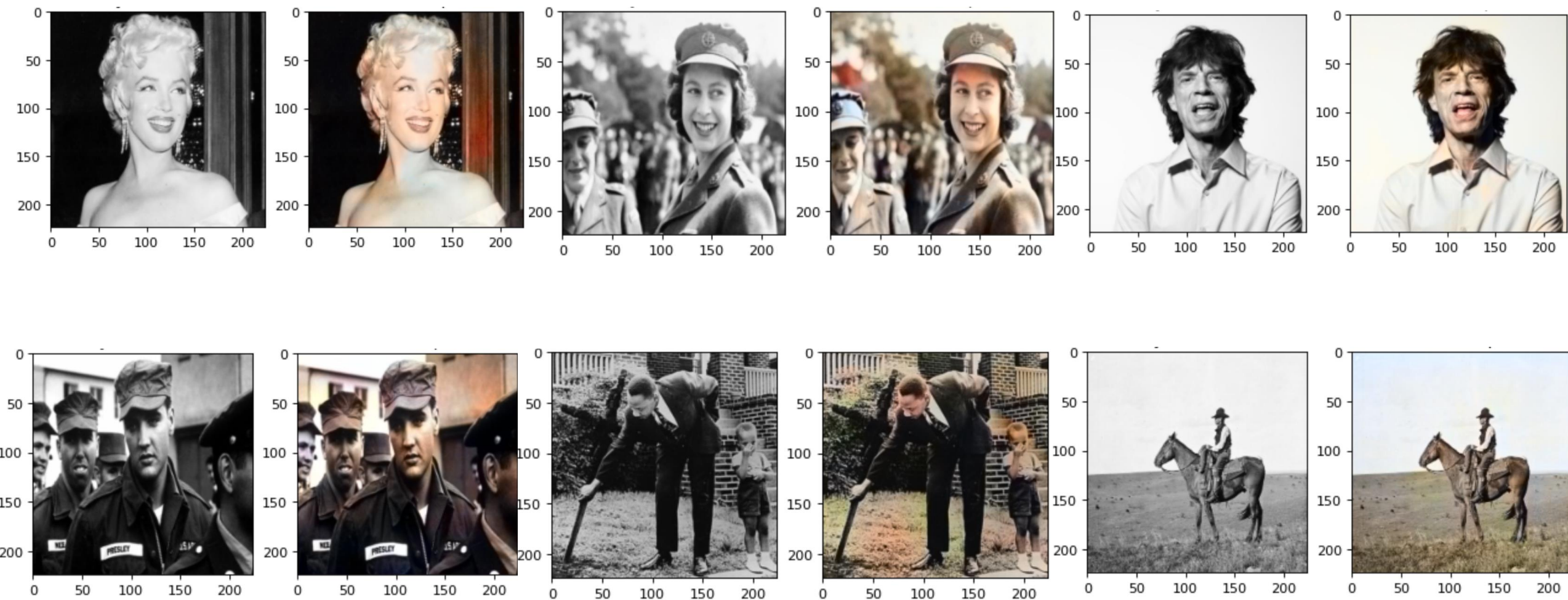
Classifier

# Results





# Coloring old/B&W images



# Thank you for your attention

Color space images and model example images obtained from:

[1] Wallner, E. (2021, February 9). *How to colorize black & white photos with just 100 lines of neural network code.* Medium. <https://emilwallner.medium.com/colorize-b-w-photos-with-a-100-line-neural-network-53d9b4449f8d>