

Image Colourisation Project

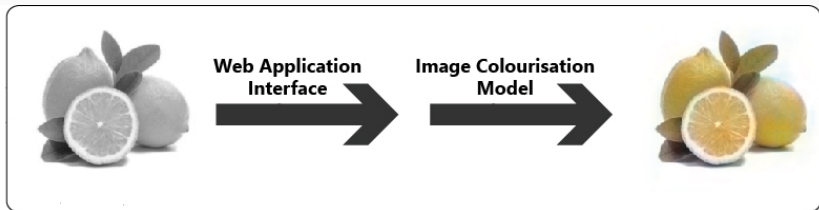
Jun-Aug 2020 | WTEF Project | Deep Learning

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September 2020

**Our journey from being entirely
clueless to completing an
Image Colourisation project
in Deep Learning**

Objective



Colorful Image Colorization paper by Richard Zhang, Phillip Isola, Alexei A. Efros

To hallucinate the most plausible colour version by training a CNN, to map from a grayscale input to a distribution over quantized colour value outputs

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Challenges

- Advanced Mathematics
- Limited Resources

AutoEncoders

A type of Neural Network used to learn representation for a set of data in an unsupervised manner

CIELAB Colour Space

- L channel: Lightness
- A channel: green to red
- B channel: blue to yellow

Technology Stack

- **Building the Model**

- PyTorch
- NumPy
- Scikit-image
- Matplotlib

- **Version Control**

- Kaggle

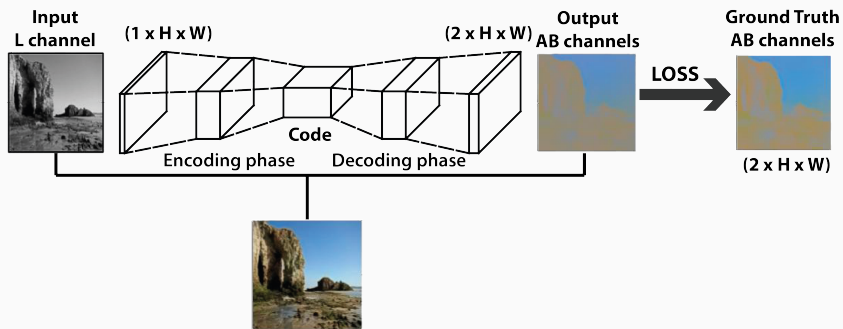
- **Web App**

- Streamlit

- **PaaS**

- Heroku

Model



Model

- Loss Function: **MSE Loss**
- Optimiser: **Adam**
- Range of Learning Rates used for training: **$1e-3$ - $1e-6$**

Challenges

- Lack of resources

Challenges

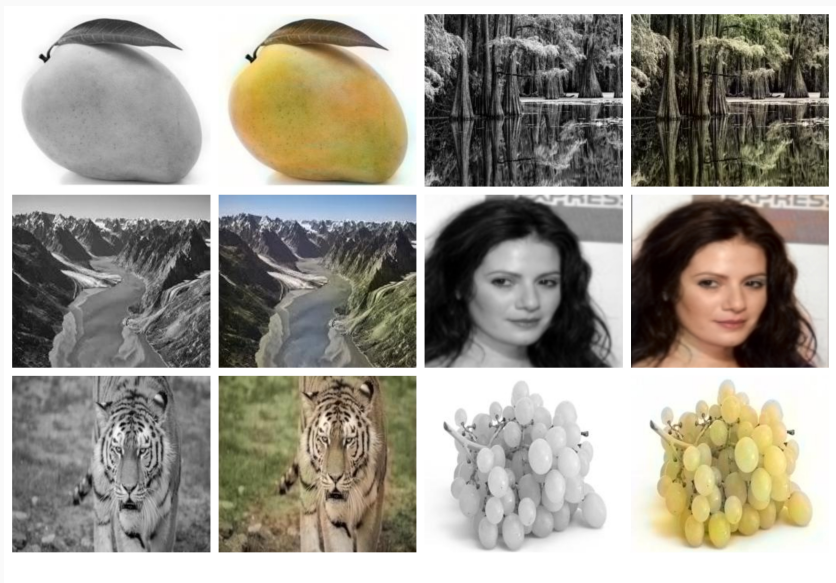
- Lack of resources
- MSE Loss is not a good parameter to measure human perception of colouring

Datasets

Trained on approximately **570K** images (Links provided below)

- ImageNet(50K Images)
- Flickr
- Landscape Classification
- Fruits 360
- Fruits Recognition
- Clothes Classification
- CelebA Dataset
- Animals 10
- Arthropod Taxonomy Dataset

Results: Good



Results: Bad



Web Application and Deployment

Web App:

- Made with Streamlit
- Why Streamlit:
 1. Reducing app code to Python scripts
 2. Treating widgets like variables
 3. Reusing data with memoization

Deployment:

- Heroku as the cloud platform

Improvements

- Adding more themes
- Automating the classification of themes
- Retrain with additional data generated using data augmentation

Sources

1. Colorful Image Colorization paper by Richard Zhang, Phillip Isola, Alexei A. Efros:
<https://arxiv.org/pdf/1603.08511.pdf>
2. Applications of AutoEncoders - Image Colourisation:
https://github.com/bnsreenu/python_for_microscopists

Our Project

- Web Application:
<https://image-colouriser-streamlit.herokuapp.com/>
- Gitlab:
<https://gitlab.com/twishabansal/image-colourisation>
- Kaggle Notebook:
<https://www.kaggle.com/sejalgupta01/image-colorization-starter>

Questions and Suggestions?