

# **Image Colourisation Project**

Deep Learning

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# About Us



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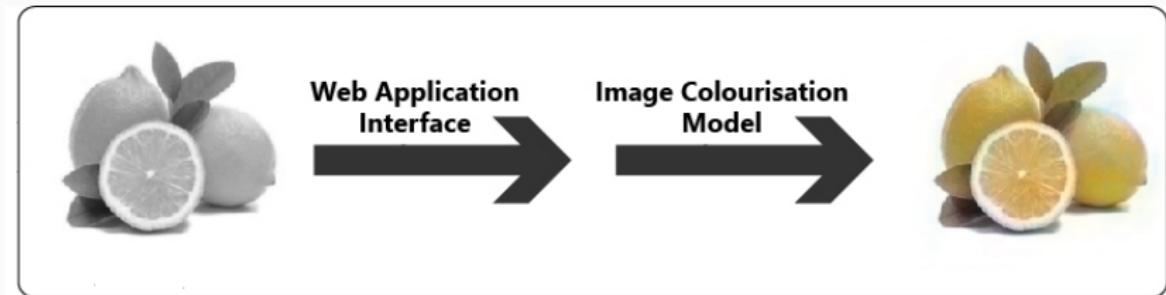
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**Our journey from being entirely  
clueless to completing an  
Image Colourisation project  
in Deep Learning**

# 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**

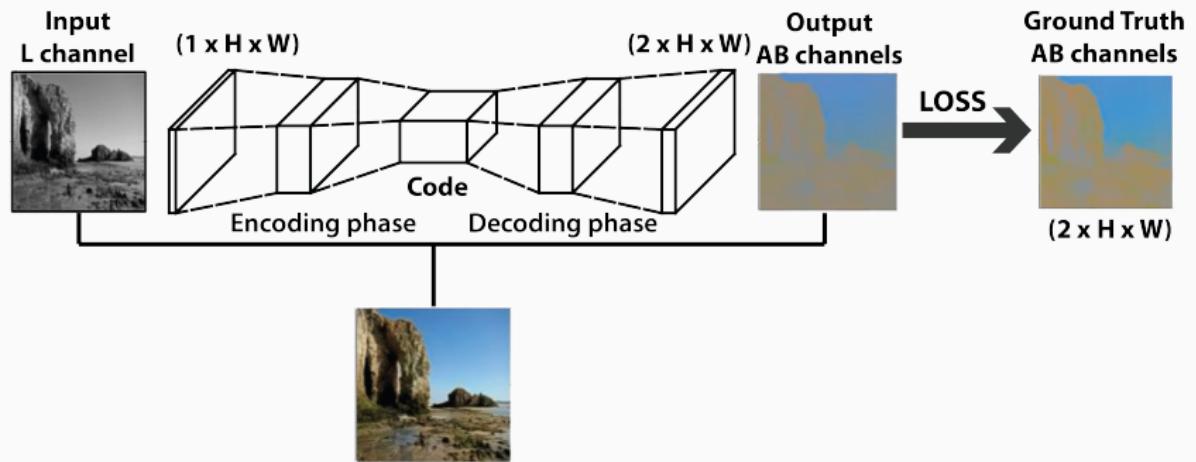
# CIELAB Colour Space

- 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](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>

**Thank You**

**Questions and Suggestions?**