Image Colourisation Project
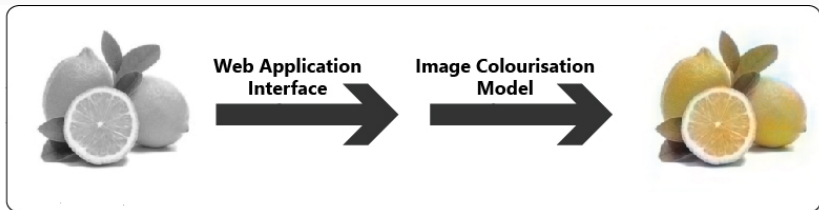
Jun-Aug 2020 | WTEF Project | Deep Learning

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Objective

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

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
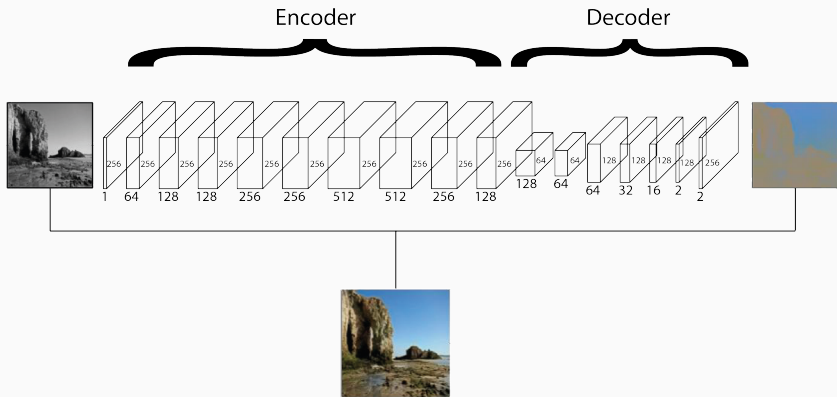 - Matplotlib

- **Version Control**
  - Kaggle
- **Web App**
  - Streamlit
- **PaaS**
  - Heroku

Model

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

Challenges

- Tensor and Numpy Array interconvertability
- Interoperatability between CPU and CUDA
- Runtime disconnects
- Signal being killed due to memory usage

Challenges

- Tensor and Numpy Array interconvertability
- Interoperatability between CPU and CUDA
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- No Mathematical Parameters like Accuracy to check results

Datasets

Trained on approximately 313K images

- ImageNet(50K Images)
- Flickr
- Landscape Classification
- Scene Classification
- Fruits 360
- Fruits Recognition
- Clothes Classification
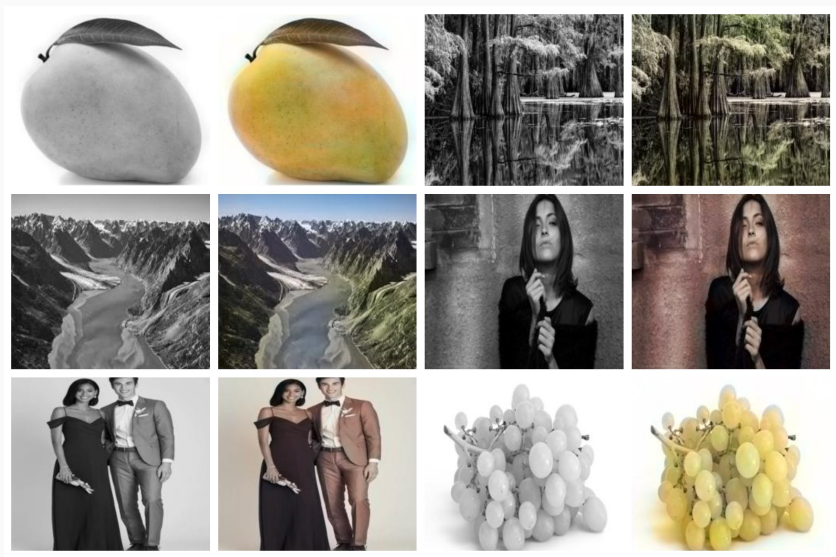
Web Application and Deployment

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

Further Improvements

- Generalising on more themes
- Automating the classification of themes
- Incorporating Data augmentation
- Compatibility with all image sizes

References

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?