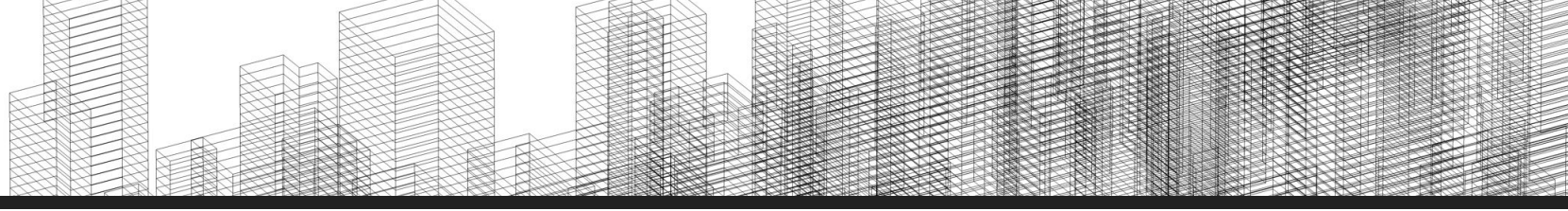
Facial Landmarks Detection with Fake-it Dataset

Overview

- Design a deep learning neural network model for facial landmarks detection
- Train the model on the CG faces
- Test the model on the real world faces
- Resolve the domain gap problem between synthetic and real world faces



Technologies

Programing Language
Python

Framework/Library
PyTorch, NumPy, OpenCV, Scikit-learn

Google Colab
Connect to and compute on GPU

Models
Xception, ResNet-50, (MobileNets in future)

Dataset

- Training data:

  CG dataset from Microsoft

  (with 70 standard facial landmarks)

Dataset

- Testing data:

  Flickr-Faces-HQ Dataset

  Video (30 fps)

Assumptions

- There is a domain gap between images of synthetic faces and images of real world faces.

- The gap is possible to be minimized through proper design of model architectures, hyperparameters and techniques of data augmentations.

Expected output

Real world samples of human faces with facial landmarks correctly annotated.

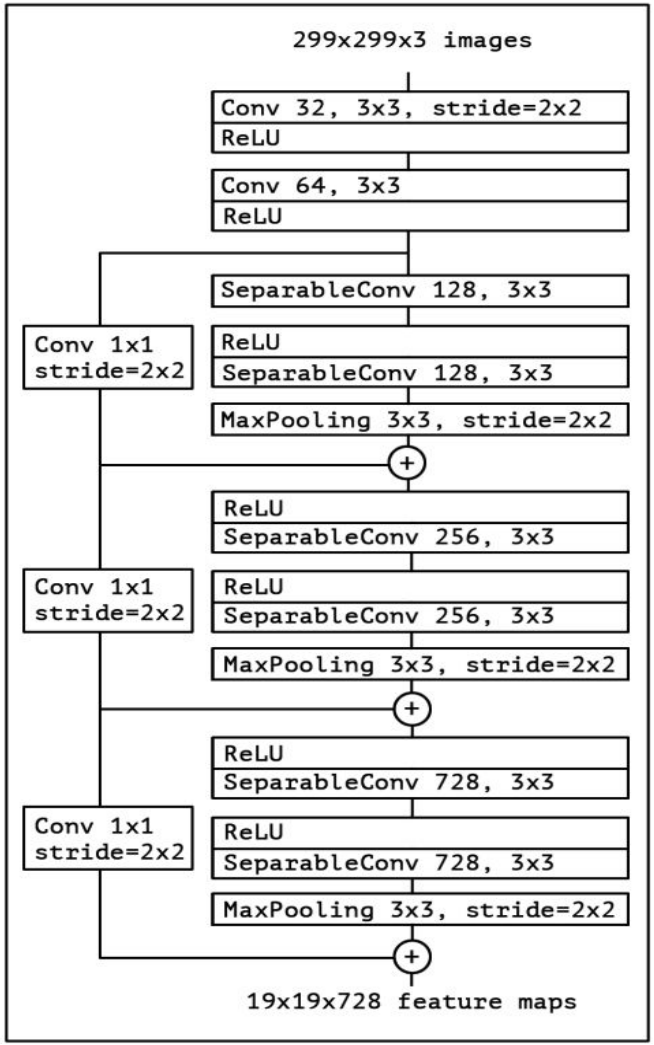
Data preprocessing

- Box the Face
- Original size: 512*512
- After resized: 128*128
- Implemented through

  TF.resize and TF.crop

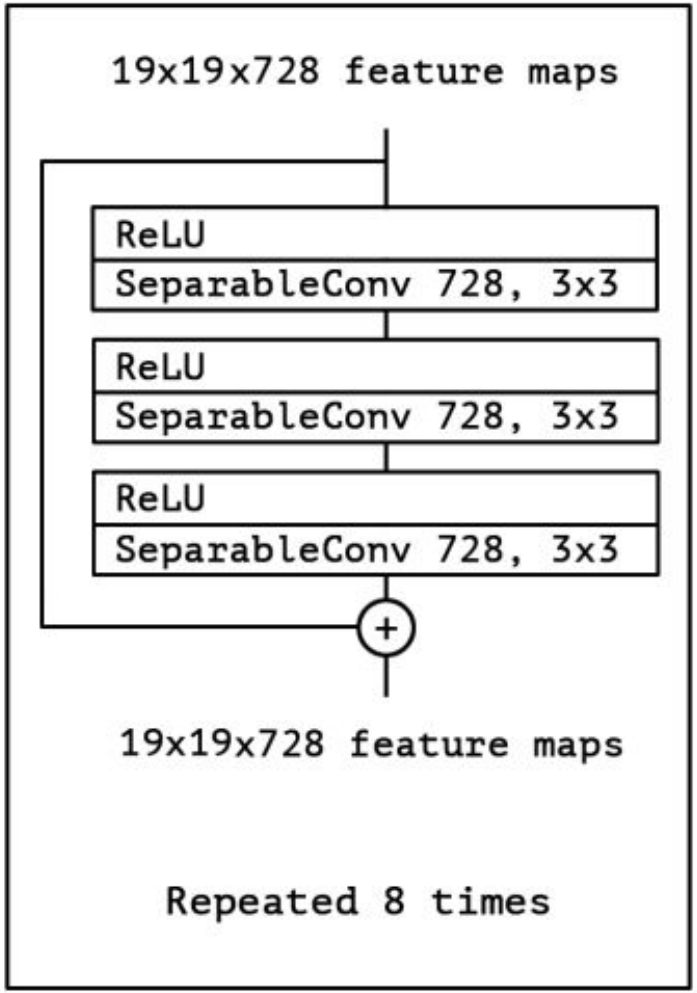
Data augmentation

- Random Gamma
- Random Contrast
- Random Hue
- Random Saturation
- Random Brightness
- Random Rotation



Network architectures

- **Xception**
  - **Entry Flow**
  - Middle Flow
  - Exit Flow



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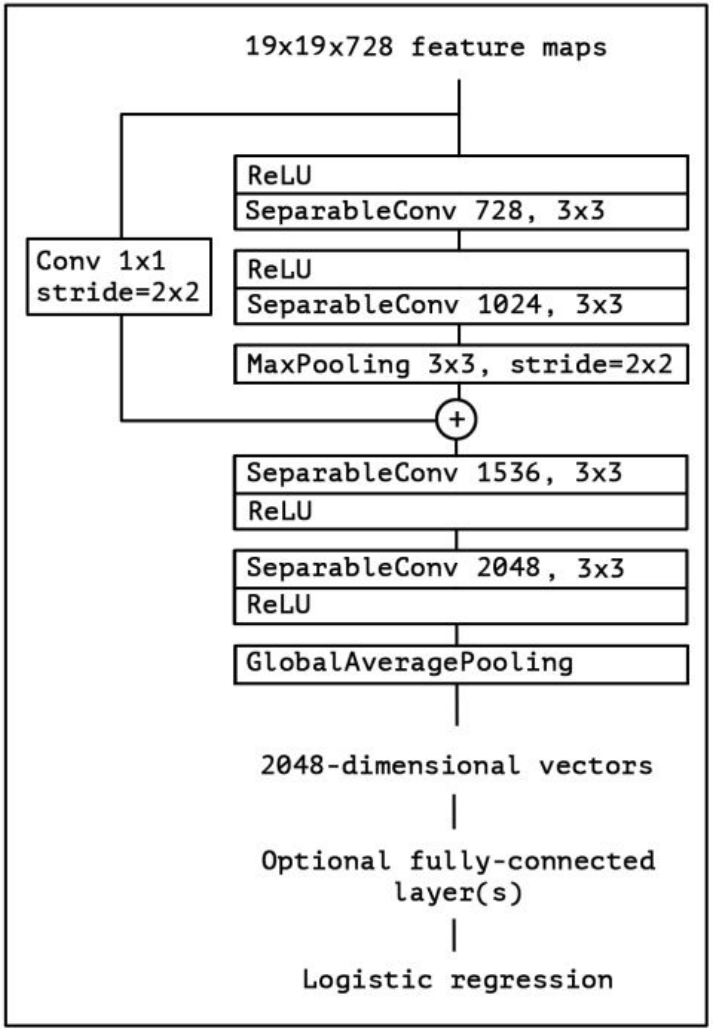

Network architectures

- **Xception**
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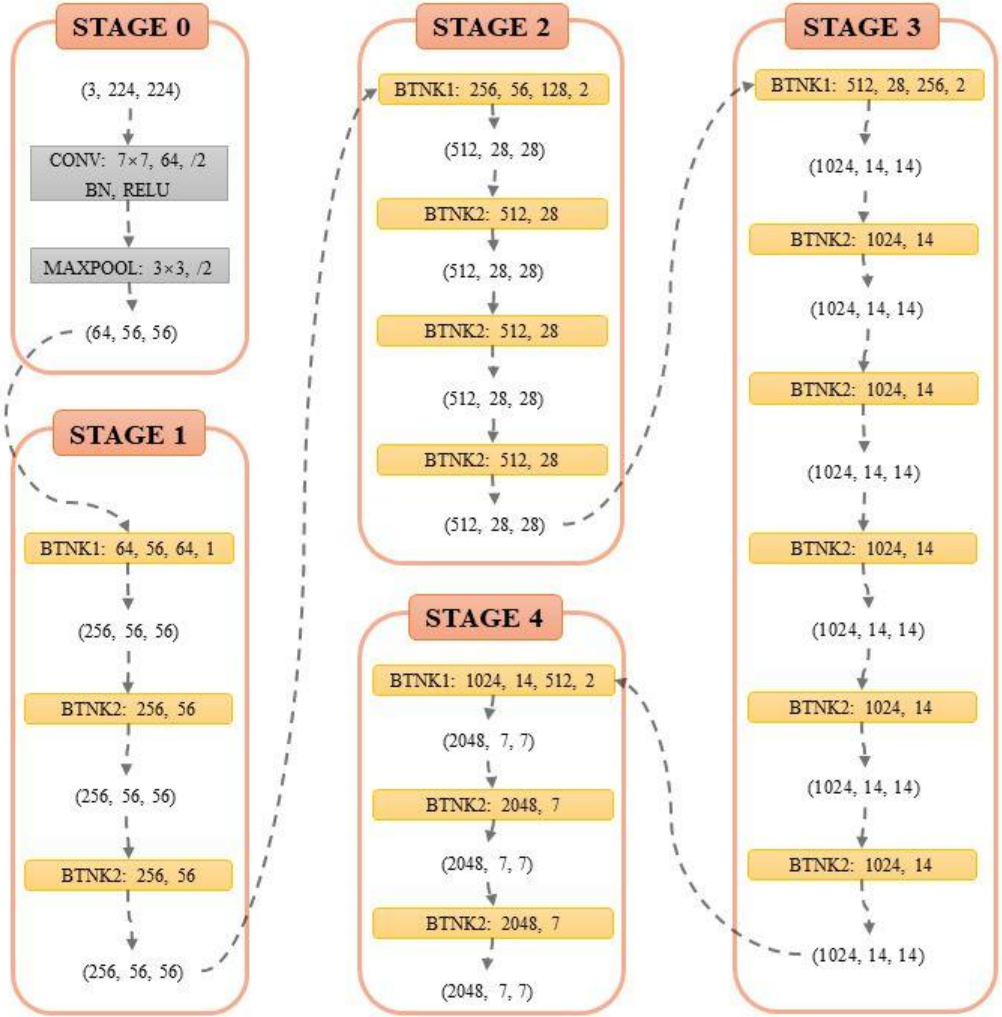
Network architectures

- **ResNet-50**
  - Stage 0
  - Stage 1
  - Stage 2
  - Stage 3
  - Stage 4



Result

- Xception

  Validation set prediction

Result

- Xception

  Test set prediction

Result

- ResNet-50

  Validation set predictions

Result

- ResNet-50

  Test set predictions

- Try other network architectures
- Discriminative model
- Hyperparameters optimization
- Compare techniques of data augmentation
- Determine the minimum viable dataset size

What we will do for the remaining time?

Thank you!