PROJECT PROPOSAL

PixelPlusUltra

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Problem Statement

When scaling up low-resolution photographs, the present state of image resolution improvement technology is restricted, frequently producing poor and blurry images. This restriction lowers the quality of photographs in a variety of fields, including surveillance, entertainment, and medical imaging. The "PixelPlusUltra" project, which intends to use the power of SRGAN (Super-Resolution Generative Adversarial Network) to greatly enhance the resolution of photographs, in order to provide crisper, more detailed, and aesthetically pleasing outcomes, is our answer to this problem.Additionally, to illustrate the difference in how to solve this issue, we may also use ESRGAN (Enhanced Super-Resolution Generative Adversarial Network).

Project Goals and Estimated Achievements

- Create a sophisticated SRGAN-based picture super-resolution model.
- Estimated Achievement: Develop a model that can consistently improve picture resolution while delivering excellent outcomes for a range of image types.
- Achieve a significant improvement in image resolution.
- Estimated Achievement:Increasing picture resolution while preserving visual integrity and image quality is what's expected to be accomplished.
- Address probable artefacts and difficulties with super-resolution of images.

- Estimated Achievement: Ensure a reliable and efficient picture improvement process by implementing solutions to typical problems including noise, artefacts, and computing efficiency.

➢ Improve the model's performance in a variety of usage situations.

- Estimated Achievement: Carry out extensive optimization to make sure the model works effectively in industries including surveillance, photography, and medical imaging.

➢ Create a sophisticated ESRGAN-based picture super-resolution model.

- Estimated Achievement: Perform the aforementioned techniques on the ESRGAN model as well in order to improve the photos using it.

➢ Compare the output from the two models.

Approach

I broke this project down into six sections, which are shown below:

1. Data gathering: To train and test the SRGAN model, compile a broad da tasets of low- and high-resolution pictures.

2. Model Development: Using the gathered dataset, create an SRGAN mod el and refine it.Utilize methods to guarantee image quality and reduce artef act.

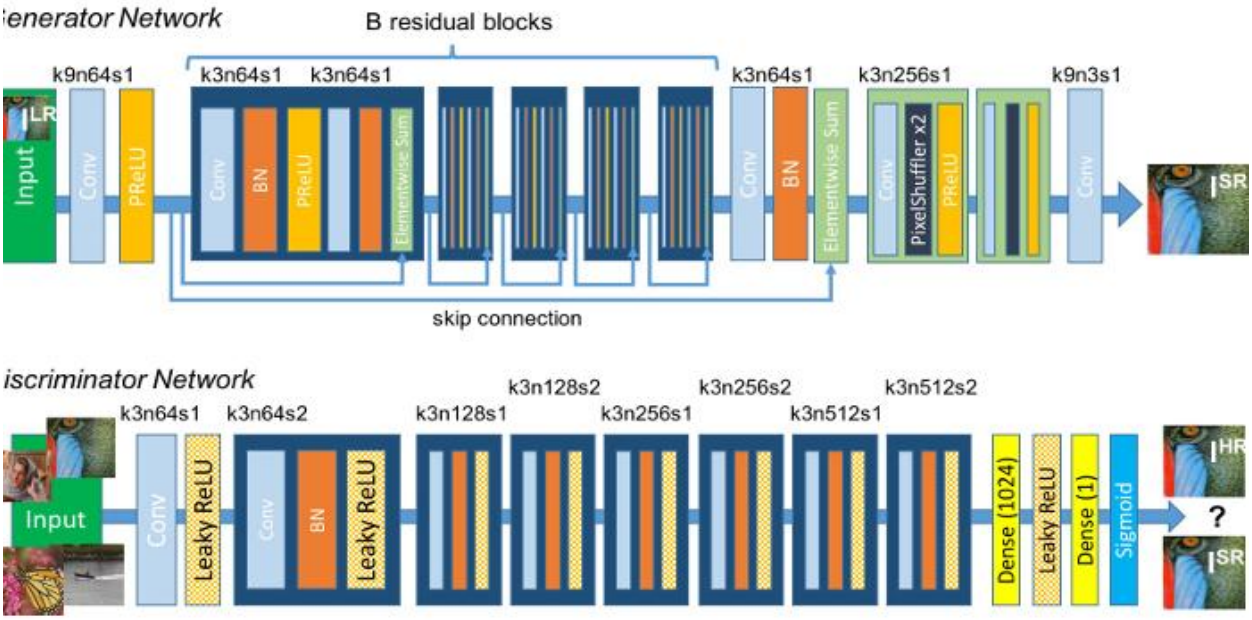
3. Optimization: Put optimizations into practise to make sure the model is ef fective in terms of calculation and processing time.

4. Feedback Loop: Collect comments to enhance the model.

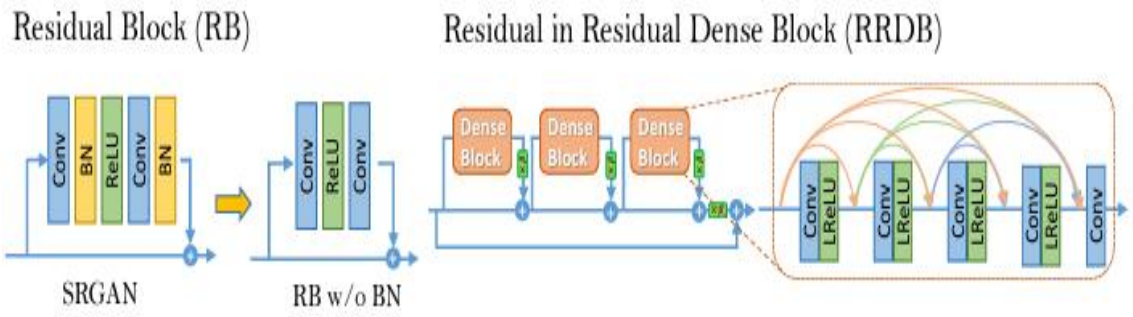
5. ESRGAN turn: Apply the same procedures to the ESRGAN model.

6. Comparing the output from the ESRGAN and SRGAN models.

Architecture



Architecture for SRGAN(source)



Architecture for ESRGAN(source)

Literature Review

For SRGAN (Super-Resolution Generative Adversarial Networks):

R. S. Kushwaha, M. Rakhra, D. Singh and A. Singh, "An Overview: Super-Image Resolution using Generative Adversarial Network for Image Enhancement," 2022 5th International Conference on Contemporary Computing and Informatics (IC3I), Uttar Pradesh, India, 2022, pp. 1243-1246, doi: 10.1109/IC3I56241.2022.10072862.

For ESRGAN (Enhanced Super-Resolution Generative Adversarial Networks):

Wang, X., Yu, K., Wu, S., Gu, J., Liu, Y., Dong, C., Qiao, Y., & Loy, C. C. (2019). ESRGAN: Enhanced Super-Resolution Generative Adversarial Networks. In Lecture Notes in Computer Science (pp. 63–79). https://doi.org/10.1007/978-3-030-11021-5_5

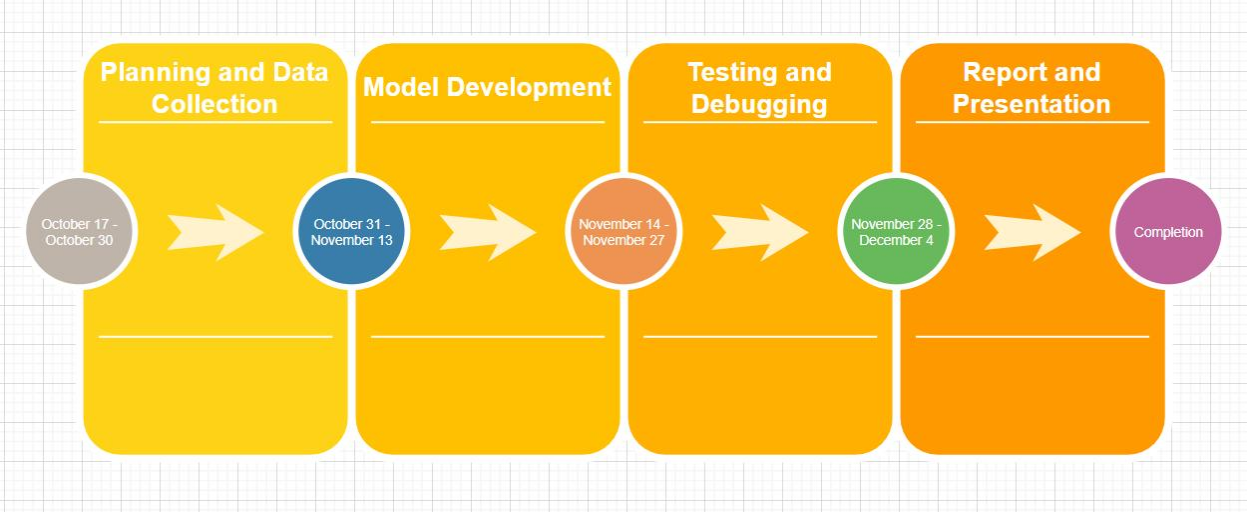
Git Repo for ESRGAN (Chapter 11):

https://github.com/paperd/deep-learning-models/blob/main/chapter11/ch11.ipynb

The Things that I'll be utilising

- Deep learning frameworks: For the creation and training of models, use deep learning libraries like TensorFlow or PyTorch.
- SRGAN Architecture:
  Implement the SRGAN architecture as the building block for super-resolution of images.
- ESRGAN Architecture:
  Implement the ESRGAN architecture as the main building block for pict ure super-resolution.
- High-Quality Datasets:
  Highquality datasets should be obtained for training and validation. The y should be diversified and of high quality.
- Hardware Resources: To speed up the model's inference and training, u se potent GPUs or TPUs.

Schedule



References

- https://pyimagesearch.com/2022/06/06/super-resolution-generative-adversarial-networks-srgan/
- https://medium.com/analytics-vidhya/esrgan-enhanced-super-resolution-generative-adversarial-network-using-keras-a34134b72b77
- https://draw.io/