Motivation

- Image Inpainting
  - A task which fills missing pixels with semantically and perceptually plausible contents.
- Problem
  - Many inpainting methods gives blurry or awkward images. From this project, I will generate clear and plausible outputs to improve image quality.

Related Work

1. Coarse to Refine
   Coarse to Refine network first produces coarse output and use this information to produce refined image.
2. RNN
   Recurrent Neural Network (RNN) is designed to deal with sequential data such as music, movie, and natural language. The main difference with other neural networks is that RNN uses past information by adding hidden states.
3. Edgeconnect
   Edgeconnect uses edge information for inpainting. Edgeconnect first produces edge map of the masked region and use this information to complete the image.

References


Experimental Results

<table>
<thead>
<tr>
<th>CelebaHQ</th>
<th>Places 365</th>
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<table>
<thead>
<tr>
<th>Model</th>
<th>Image</th>
<th>PSNR</th>
<th>SSIM</th>
<th>Loss</th>
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</thead>
<tbody>
<tr>
<td>Coarse</td>
<td>Image 1</td>
<td>30.25</td>
<td>0.79</td>
<td>0.50</td>
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<tr>
<td>Refine</td>
<td>Image 2</td>
<td>31.25</td>
<td>0.82</td>
<td>0.52</td>
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</tbody>
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Conclusion

- Analysis
  My model produces better outputs than other methods for both face and place dataset. The outputs are more natural and give better PSNR, SSIM, and Loss.
- Future Work
  However, there are some cases which coarse outputs are better than refine outputs. There might be a problem with refine network. Hence, the refine module can be modified to solve this issue.

New Technique

- Recurrent Convolution
  - Implement RNN structure by using buffer
- Sobel Edge Discriminator
  - Sobel edge discriminator distinguishes real and fake edge map of generated image and the ground truth
- Frequency Separation Loss
  - Coarse Route : L1 loss of low pass filtered image
  - Refined Route : L1 loss of high pass filtered image