**Review of underlying framework**

The underlying framework operates by taking in input the occluded image, an exemplar, and the ROI where the occlusion can be found.

Subsequently, we create an image pyramid for both source and exemplar, where each pyramid level is downsampled by a factor of 2.

For each pyramid level, we create a dense correspondence between the source and exemplar, which is shown as the colorful image. Dense correspondence matches each patch to a patch in the exemplar, characterized by its center position, the scale, and the orientation. Note about visualization and which channels we are using, explain that if noisy means bad matching parameters.

The dense correspondence is usually noisy in the occluded area, and as a result, we interpolate the NNF within the ROI using an expectation maximization technique, the specifics of which I will not go over here.

Because the source and the exemplar could have been taken from various viewpoints and in different conditions, it is usual to note a color discrepancy between the two. As a result, we need to apply a color correction to the transfer pixels in order to achieve realism.

**New framework**

The new framework aims to add two further processing stages to the current design, namely one to select the two optimal exemplars amongst the candidates and one to provide a final reconstruction using the respective reconstruction results of the exemplars. The new framework is roughly outlined in Figure 6.2. For our purposes, the initial pool of candidate exemplars will be limited to around 10 images which are assumed to be of the same scene as the source image. The framework will select two exemplars from amongst all candidates that it deems most suitable for reconstructing the given source image. The original algorithm will then be applied for each exemplar, yielding two distinct completion results, which we hereafter refer to as the intermediate reconstructions. The final processing stage will subsequently fuse these completion results to produce a final reconstruction.

Discuss trade off between how early the Exemplar Selector processing stage is and how accurate its selection can be.

**Scoring metrics**

We ran some image completion experiments and made several observations along the way about what constitute a good vs. bad reconstruction, which I will clarify now. The first observation (important say that these observations use Milan Cathedral for illustration but are based on other images as well):

**BRIEFGist**

One thing to note is that obviously for a good reconstruction, the exemplars have to be as similar as possible to the original image. This is both in terms of viewpoint and color variation. So, propose a metric based on the BRIEFGist descriptor (extends BRIEF as holistic image descriptor)

Explain BRIEF

Explain first modification

Explain second mod.: Stems out of the concern that an exemplar too is occluded in a similar manner as the source image. As a result, we want to penalize any similarity.

**Edge Detection**

Using observations around final reconstructions, we notice that bad reconstructions do not smoothly propagate edges and lines into the ROI. Therefore, design a metric that measures the similarity between the edges inside and edges outside the ROI (discuss neighborhoods)

Problem: only works for images that have a lot of structure and edges.

**NNF Gradient**

In a similar way to edge detection, but using

**Probability Based Method**

We now seek to create a more tailored and sophisticated reconstruction method that uses insightful information to perform the completion.

In the NNF interpolation, we calculate the quantity p\_i, which is the probability that the data pair is an inlier of the model parameter.

Thus, we complete a specific patch in the source image with the correspondind patch in the intermediate reconstruction with the higher inlier probability.

Lack of alignment causes some obvious distortion.

**Isophote-based method**

We propose a method that seeks to align the two intermediate reconstructions first before using them for the reconstruction.

Thus, there are two steps:

First we align the two intermediate reconstructions, and then we apply the reconstruction again in a patch-wise fashion, by selecting the most suitable patch.

Alignment:

For the alignment process, we create the first intermediate reconstruction as we do normally.

We then align the second intermediate reconstruction to the first.

This is best shown using an example.