1. **Inpainting**

- process of **reconstructing lost or deteriorated parts** of images and videos
- in the case of a **valuable painting**, this task would be carried out by a skilled image restoration artist
- in the **digital world**, inpainting (also known as image interpolation or video interpolation) refers to the application of sophisticated algorithms to replace lost or corrupted parts of the image data (mainly small regions or to remove little defects).

2. **Original Image**

3. **Corrupted Image**

4. **Diffusion Algorithm**

   **Algorithm 1: Diffusion**
   
   ```
   while exist lost pixel do
   1. choose lost pixel on boundary
   2. look at known neighbours pixels
   3. compute weighted average of neighbours pixels
   4. fix lost pixel with this average;
   ```

5. **Texture Synthesis**

   **Algorithm 2: Texture Synthesis**
   
   ```
   while exist lost pixel do
   1. choose lost pixel on boundary
   2. look at known neighbours pixels
   3. find something similar in the picture
   4. get the candidate
   5. fix lost pixel with this candidate
   ```

6. **Low Rank Approximation**

   **Algorithm 3: Low Rank Approx.**
   
   ```
   Rank = 1
   find image M with Rank which minimize error between M and known pixels
   while error is big do
   1. Rank = Rank + 1
   4. find image M with rank(M) = Rank which minimize error between M and known pixels
   ```

7. **Low Rank Approximation - Non-smooth Boundary**

   20% of data is missing  
   50% of data is missing  
   80% of data is missing

8. **Netflix**

   Netflix, Inc., is an American provider of on-demand Internet streaming media. Registered users can rate seen movies. Based on their ratings Netflix would like to predict their rate on unseen movies (and therefore suggest them movie which they would like).

   ![Netflix Example](example.png)

   Netflix would like to fill all "?" in his database to suggest to Andrew to watch *Batman* and to Henrich to watch *Harry Potter*.

9. **Comparison**

<table>
<thead>
<tr>
<th>Original</th>
<th>Diffusion</th>
<th>Texture Syn.</th>
<th>Matrix Completion</th>
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