Image Processing of Damaged X-Ray Images

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* Explanation of each step
* Flow chart of all steps
* Images showing the change with the step alone
* Images showing full run without the step
* Graph of classifier accuracy based on each step

## Overview

I was provided with a set of 100 coloured X-Ray images of patient’s lungs. These images suffered with significant distortions, and I was tasked with processing these images to improve the classifier’s accuracy.

The classifier had an accuracy of 0.55 before any processing.

## 2.0 Image Processing

### 2.1 Projective Transforms

All images were warped, affecting only their perspective. All images had the same warping, therefore I applied a projective transform.

### 2.2 Denoising

All images contained significant amounts of Gaussian and salt-and-pepper noise, which posed issues as I had to strike a balance between retaining image details and removing noise.

I first tackled the salt-and-pepper noise. OpenCV’s MedianBlur() function had caused significant blurring of the image, therefore I implemented an adaptive median filter in order to only replace a pixel’s value with the average of the neighbourhood, if the pixel deviated by more than a set threshold. This threshold was adjusted for each colour channel.

### 2.3 Colour Balancing

Reference images showed a lot more green and orange than present in the damaged images.

### 2.4 Brightness / Contrast

### 2.5 Edge Enhancement

## 3.0 Inpainting

### 3.1 Mask Detection

### 3.2 Inpainting

## 4.0 Summary and Analysis