Step 3

Method

A Median Filter has been used to remove the salt and pepper noise within the image. As displayed in figure 1, the filter has worked well to remove the outlier pixels whilst retaining overall image quality. How it works, in built vs. own made

Padding

Zero padding has been used. The median filter therefore has full coverage of the image including it corners and sides. Alternatively the image could be cropped. However this would reduce PPI losing image detail.

Filter Comparison

When testing a mean filter, output displays grey specks in similar positions to the salt and pepper noise. This is due to the linear filter being more sensitive to the 0 and 255 outliers. Pixels true to the original image are being influenced by outlier pixels in their neighborhood. With its trait of selecting the middle value within a pixels neighborhood a median filter is less sensitive to these outliers and therefore in this case a better choice for noise removal than the mean filter.

"The median is much less sensitive than the mean to extreme values (called outliers). Median filtering is therefore better able to remove these outliers without reducing the sharpness of the image."

A Gaussian filter seems to remove the salt and pepper noise however does not preserve edges of the image as well as the median filter. In terms of speed the linear trait of the Gaussian algorithm is likely to be faster than median filter's non-linear sorting process. However maintenance of detail is crucial in later stages i.e. identifying the starfishes. As a result detail over speed is an accepted trade off.

A Wiener filter has been used to determine if the tailoring of local image variance removes more noise than a median filter. It seems when defining a 3 by 3 neighborhood, the wiener filter has relatively poor performance removing a small amount of salt and pepper noise.

