

MM3110 Assignment 6 Part-3

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October 28, 2021

1 Problem 1

The source code for this question is in the file *pt3q1.m*.

To perform PCA, I chose the following microstructure of a compacted graphite iron. The grayscale image

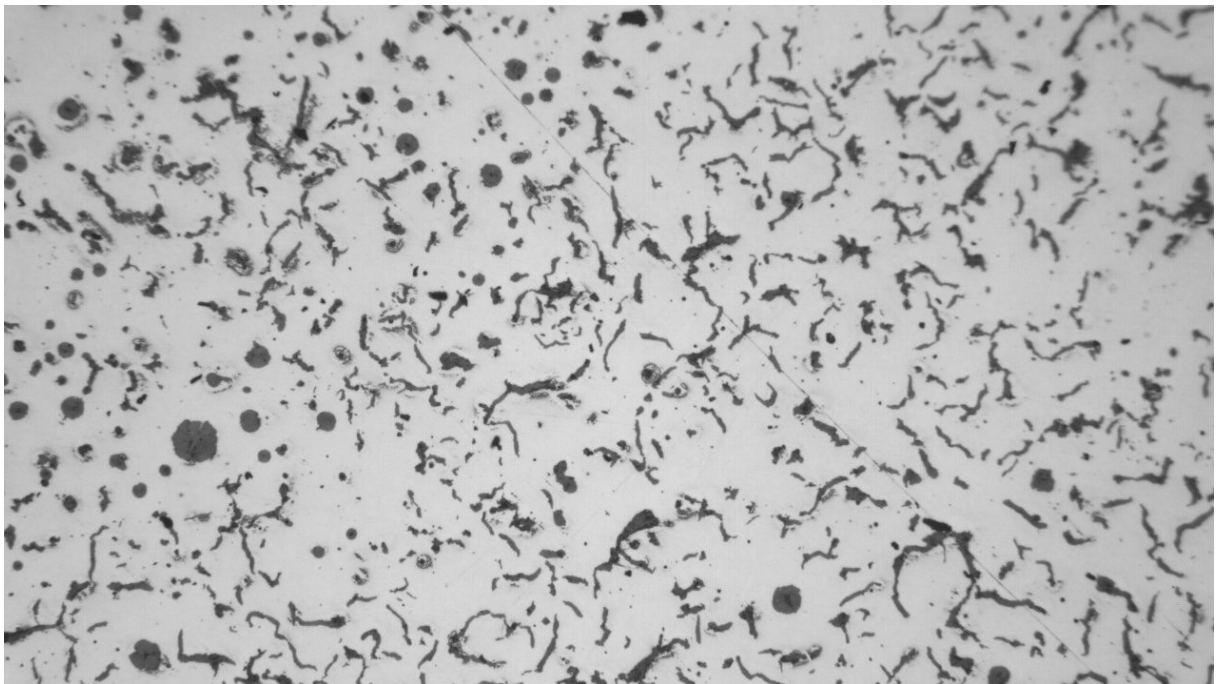


Figure 1: Original input image of the microstructure of a compacted graphite iron
of the original microstructure used to perform PCA is given in Figure 2.

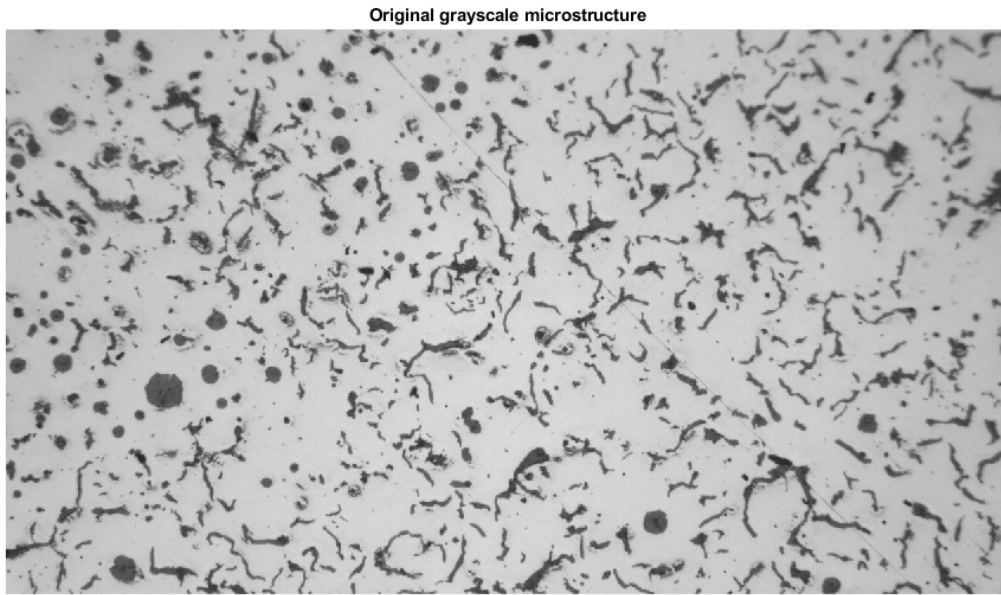


Figure 2: Grayscale image of the original microstructure

On performing PCA on the image above, the following **Scree plot** was obtained.

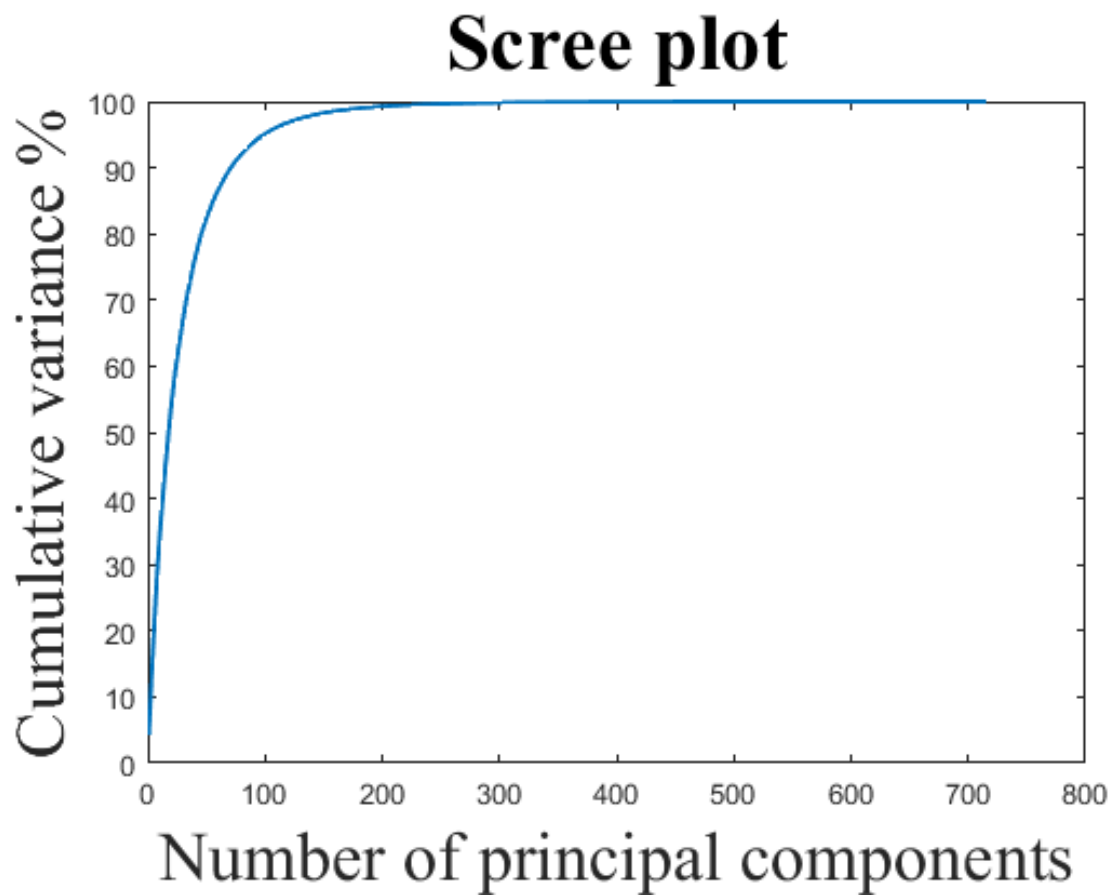
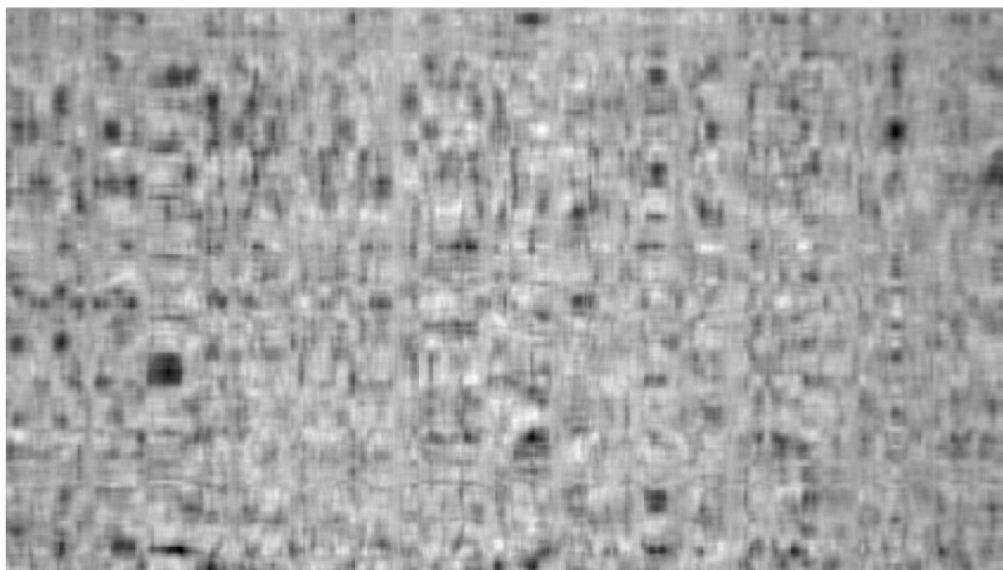


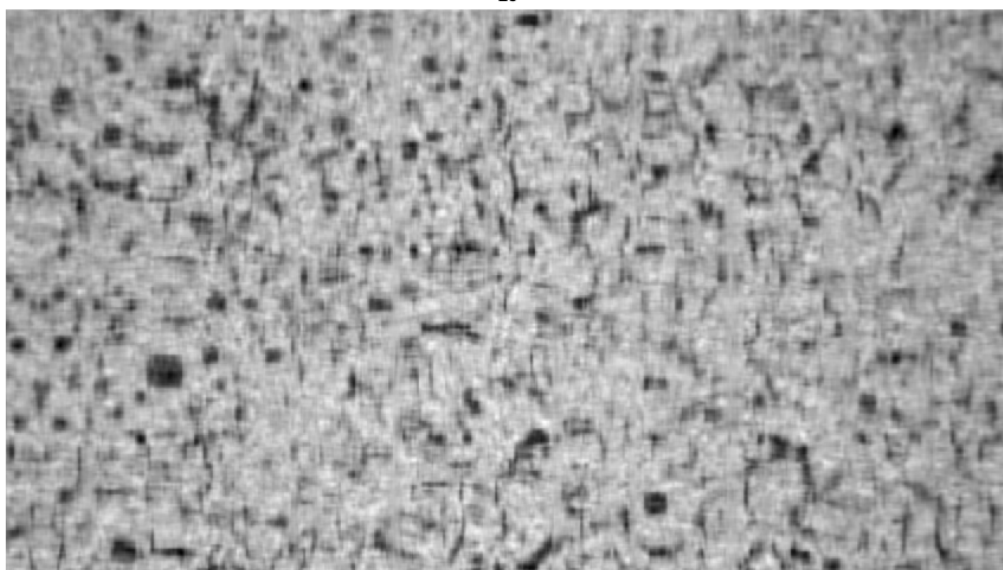
Figure 3: Scree plot for the microstructure above

Reconstructing the image using 10, 25, 50 & 75 principal components, the following results were obtained.

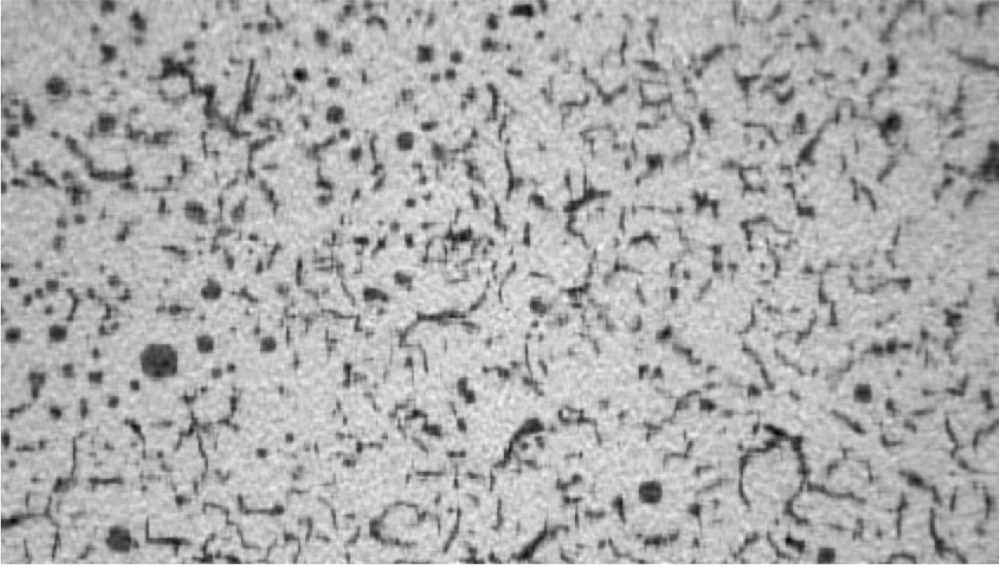
10



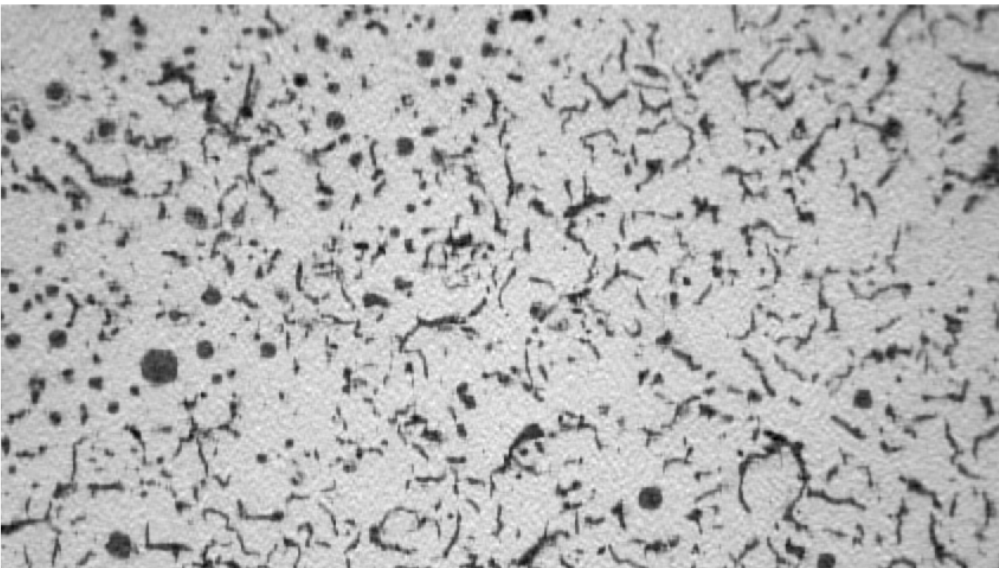
25



50



75



110 principal components are required to capture 95% of variance in the original data. The image reconstructed using 110 components is in Figure 4.

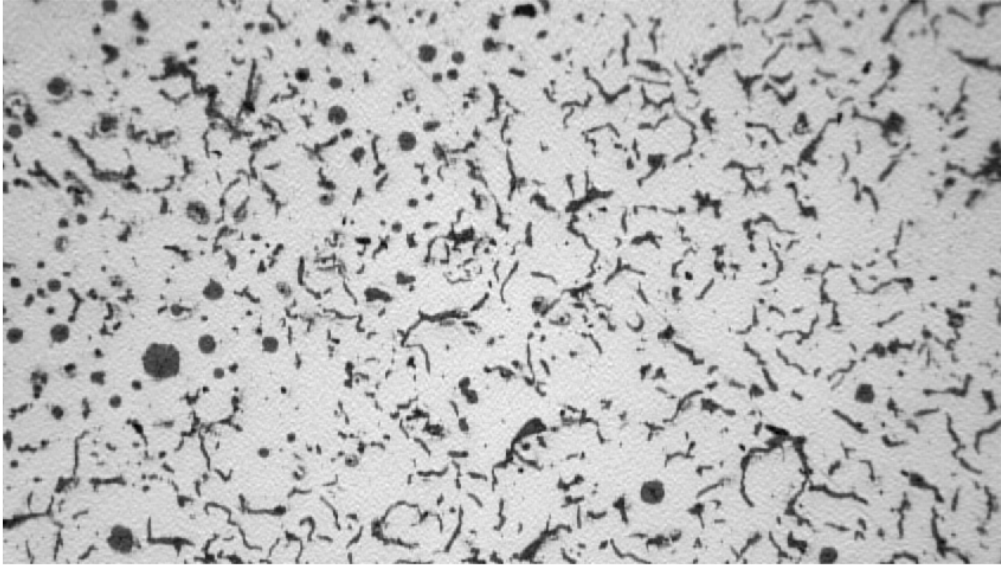


Figure 4: Image reconstructed using 110 principal components

On comparing the grayscale image of the original microstructure and the image reconstructed using 110 principal components, it can be observed that :

- Apart from the slight graininess in the reconstructed image, both the images look almost identical.
- The image has reconstructed the nodules and the flakes quite well and they look identical to those in the grayscale image.