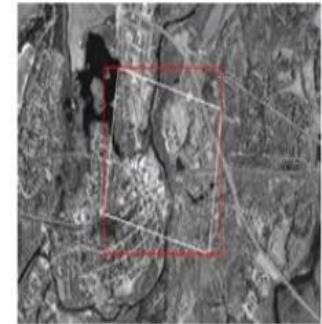
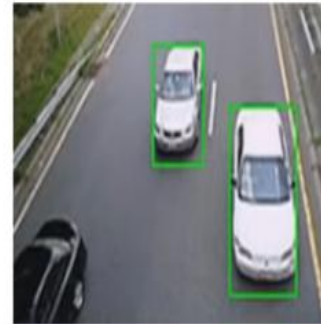
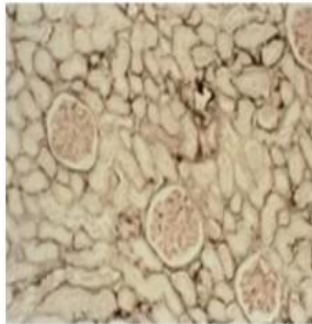
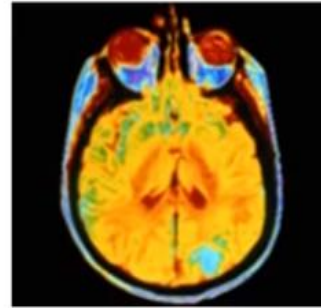


Image Processing Enhancement

Velar Hikmat Elias

Applications: Image and Video Processing

- Medical imaging
- Surveillance
- Robotics
- Automotive safety
- Consumer electronics
- Geospatial computing
- Machine vision
- and more...



Common Image Processing Challenges

- Reading and writing to various file formats
- Create and test algorithms with what-if scenarios
- Identifying causes of algorithm failure
- Visualizing images and intermediate results
- Processing large images with limited memory
- Executing algorithms faster

Workflow: Image and Video Processing

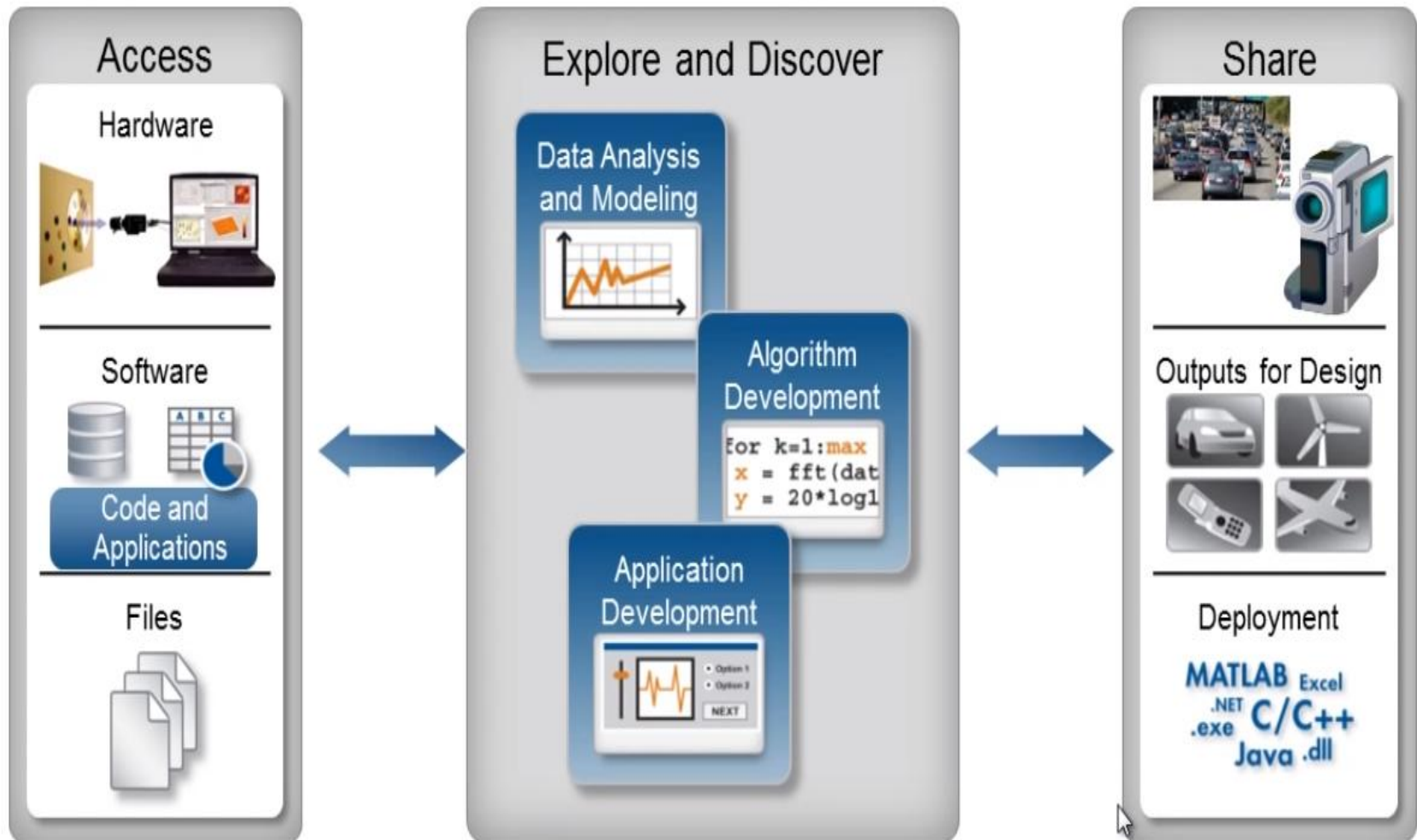


Image Processing Toolbox

Perform image processing, analysis, visualization, and algorithm development

- Image display and exploration
- Image enhancement
- Image analysis
- Morphological operations
- Image registration
- Geometric transformation
- ROI-based processing

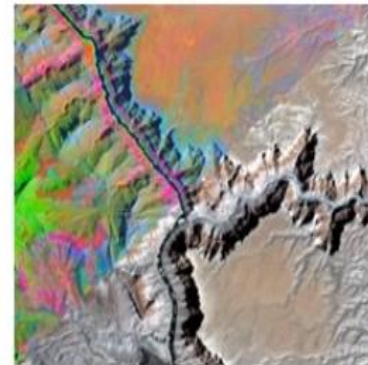


What is image enhancement?

Pre- and Post-Processing

Image enhancement is the process of adjusting digital images so that the results are more suitable for display or further processing.

- Noise removal
- Deblurring
- Filtering ...



Demo: Image Enhancement



Goal:

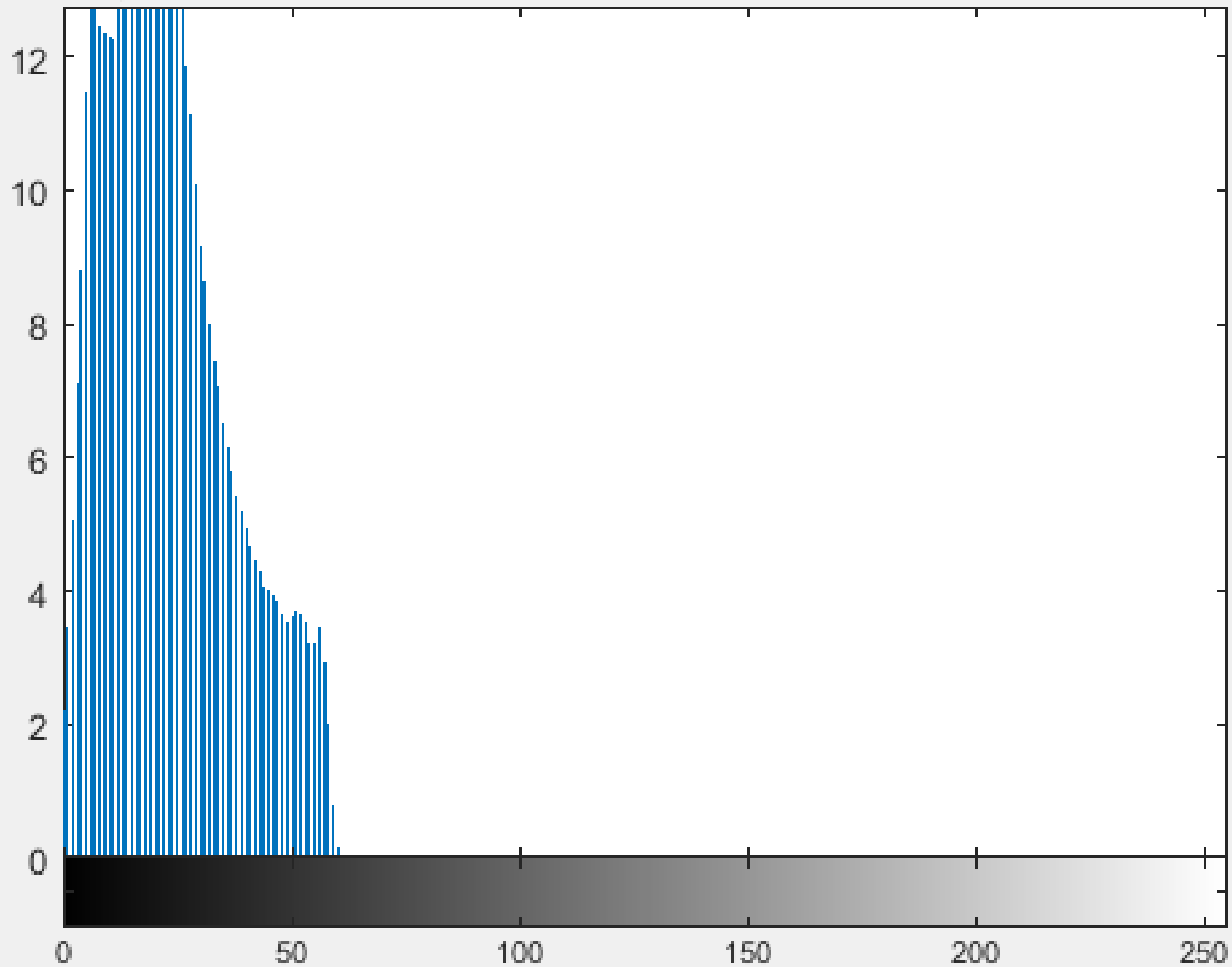
- Import and visualize **Dohuk city**
- Correct for poor contrast and unbalanced colors

erbil Composite (Un-enhanced)

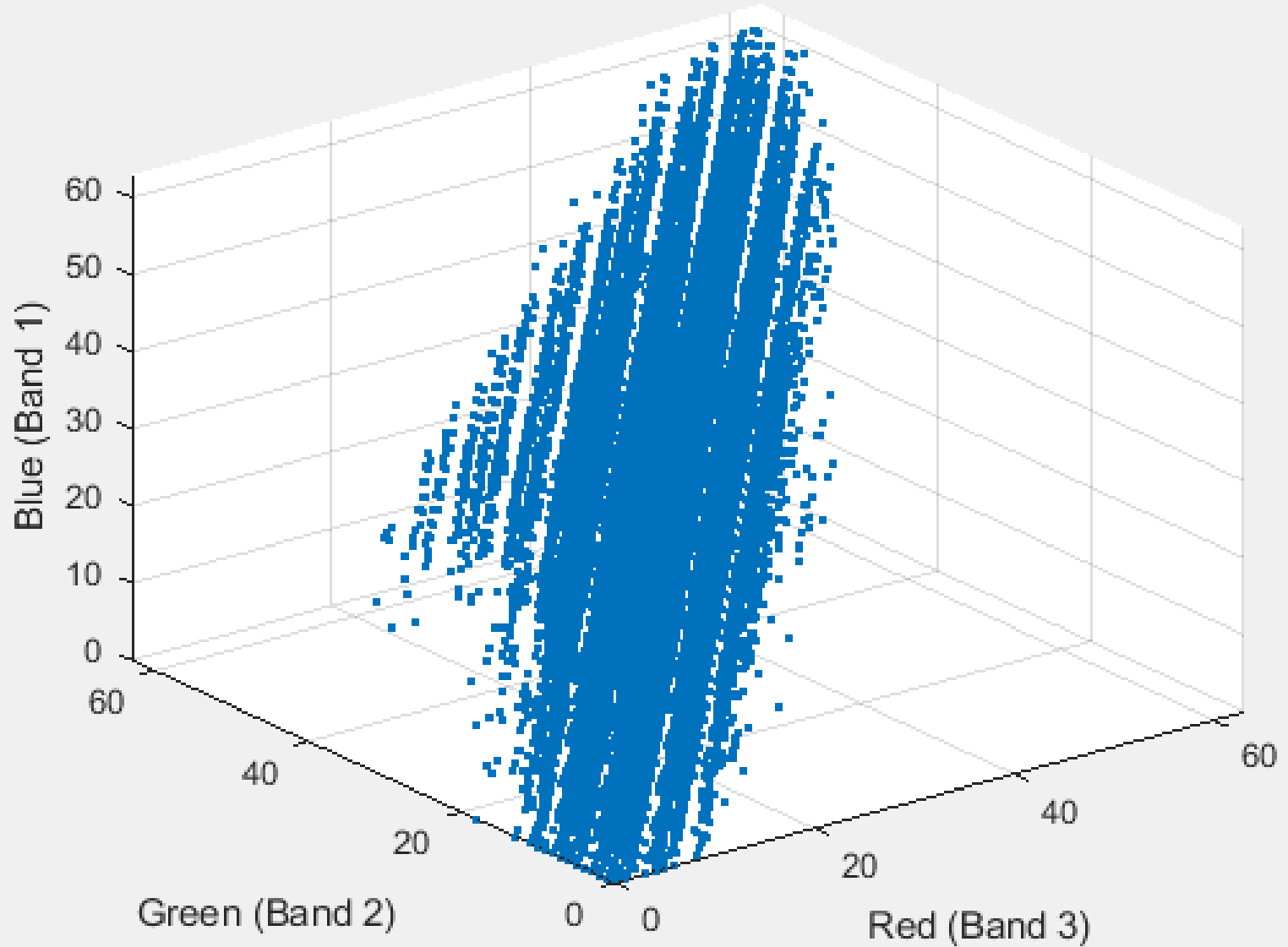


$\times 10^4$

Histogram of the blue Band (Band 3)



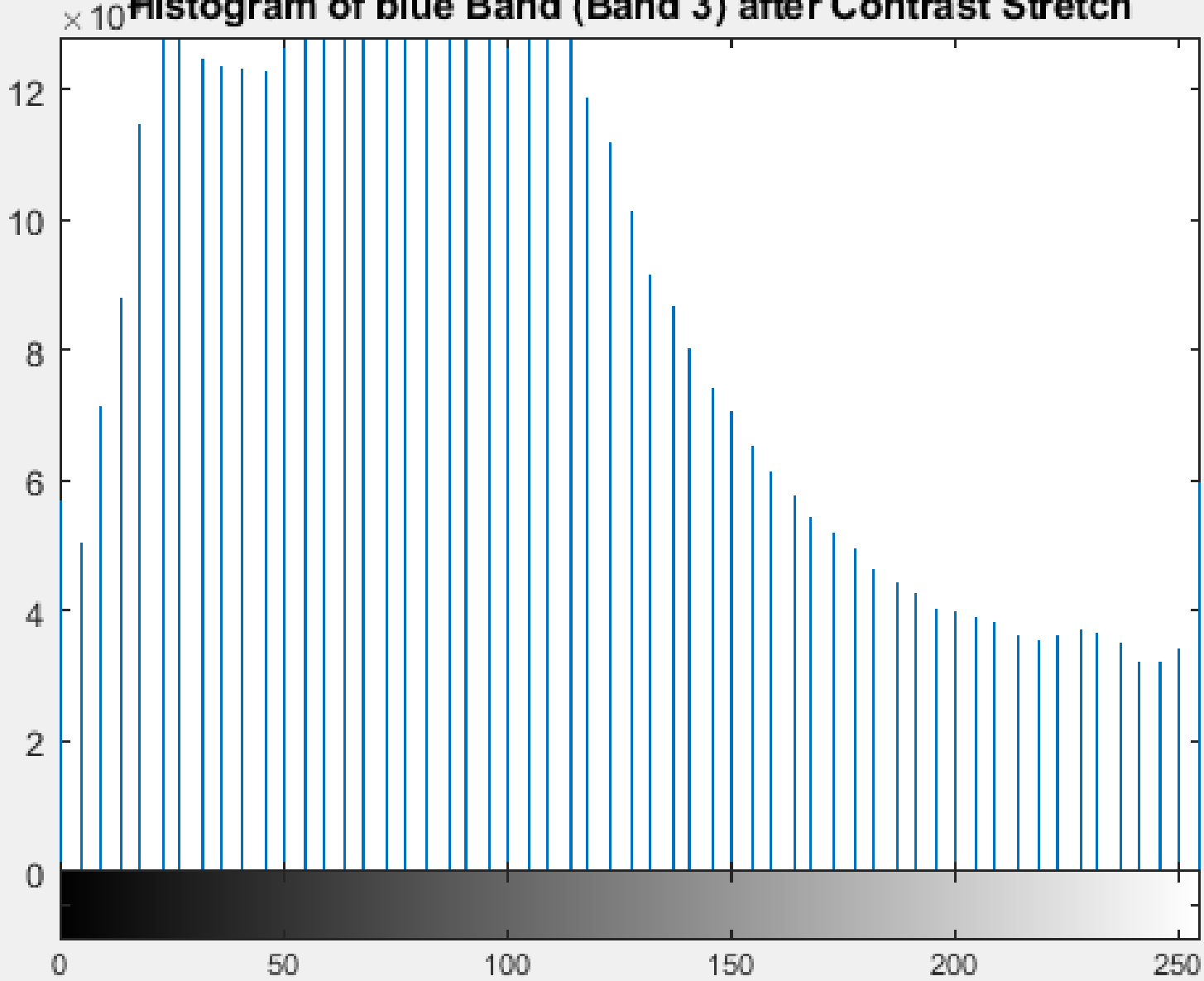
Scatterplot of the Visible Bands



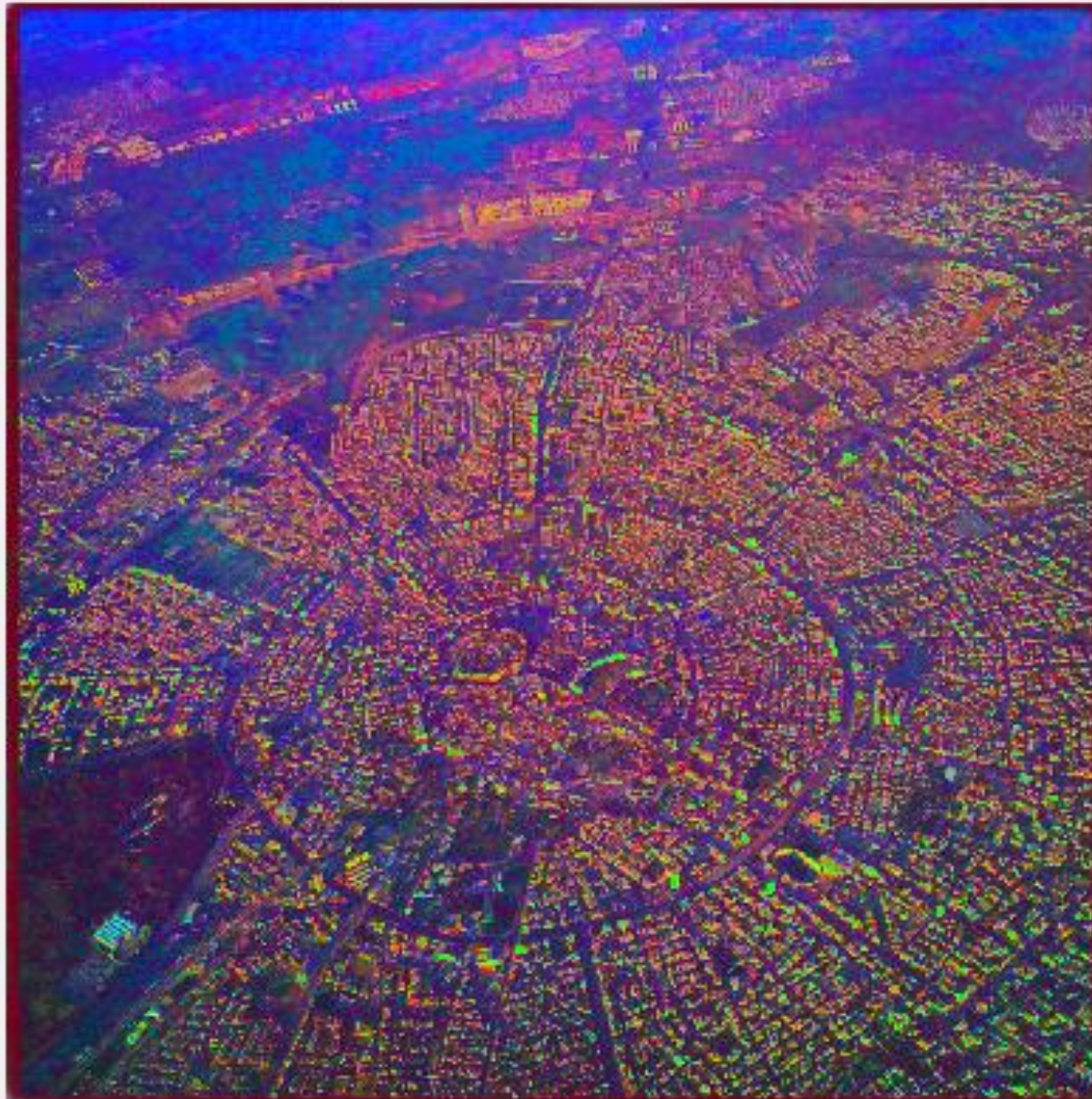
erbil Composite after Contrast Stretch



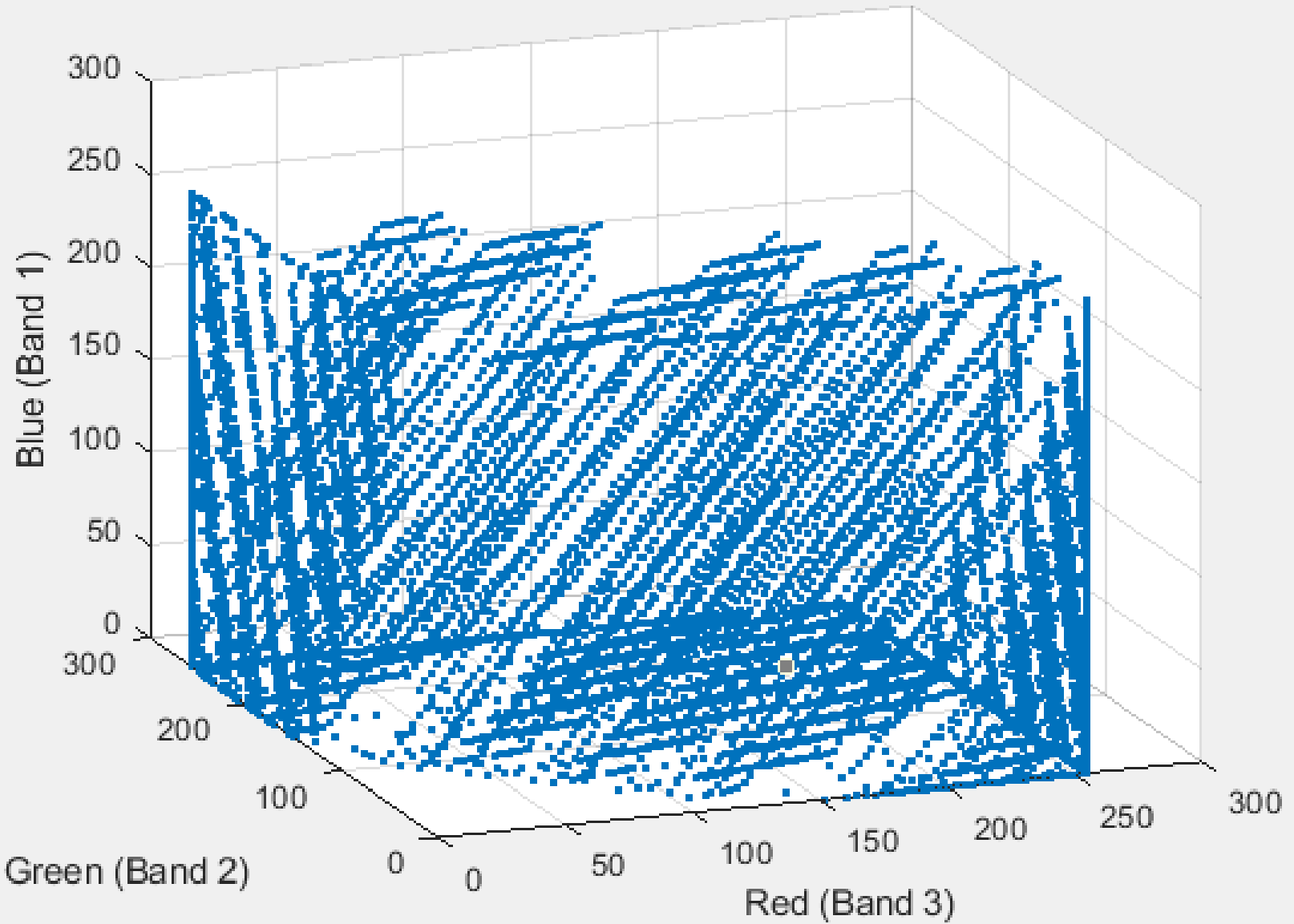
Histogram of blue Band (Band 3) after Contrast Stretch



erbil Composite after Decorrelation Stretch

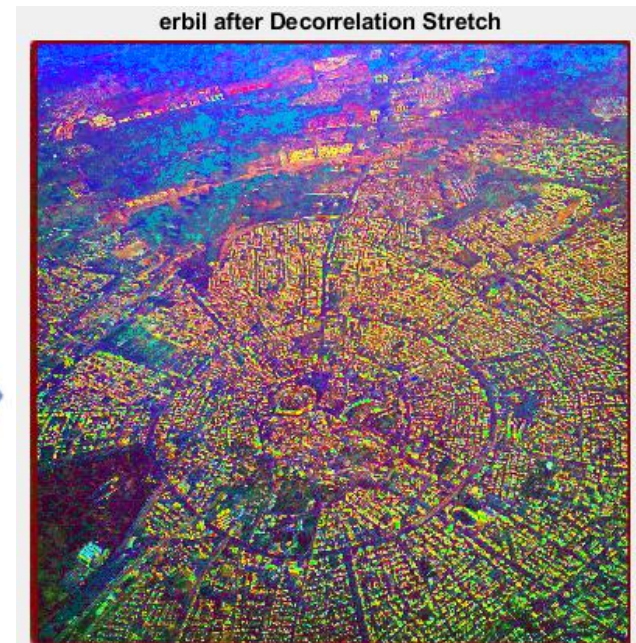
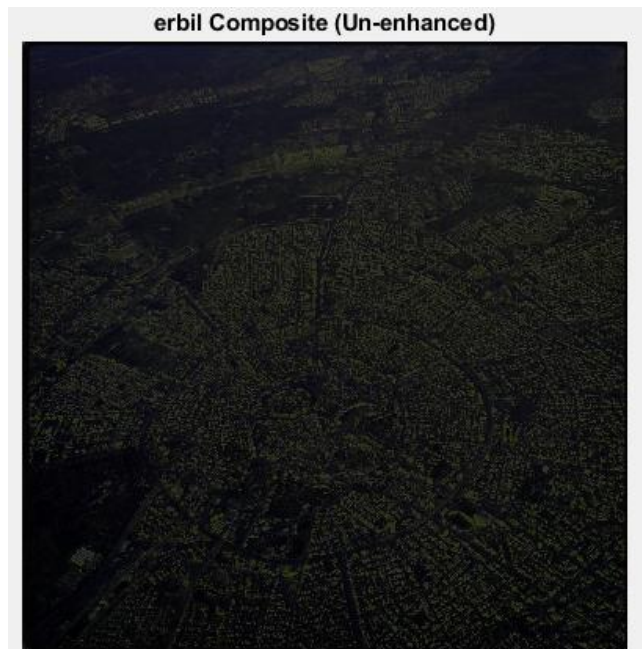


Scatterplot of the Visible Bands after



Demo Summary: Image Enhancement

- Visualize images
- Visualize histogram and scatter plot
- Perform contrast and decorrelation stretch



Thanks