Contents 1

- **Spatial Domain Processing**
  - **Histogram**
    - Compute histogram
    - Histogram equalization
    - Histogram matching
  - **Spatial filtering**
    - Piecewise-Linear Transformations
      - Contrast Stretching
    - Image Subtraction
    - Smooth filters
    - Sharpening filters – first order derivatives (gradient), second order derivatives (Laplacian), Unsharp mask/highboost filtering

Contents 2

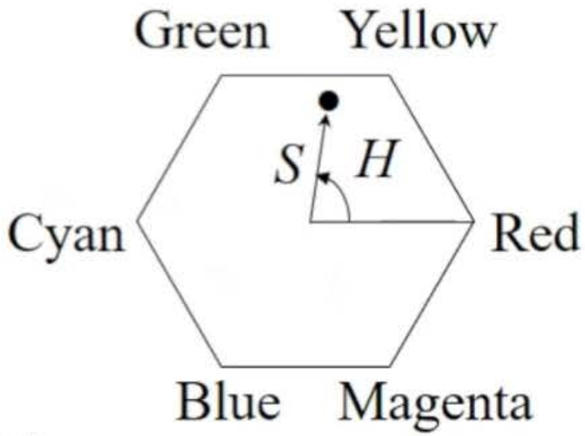
- **Frequency Domain Filtering**
  - **Steps for filtering in frequency domain**
  - **Smoothing filter**
    - Ideal, Butterworth, Gaussian
  - **Sharpening filter**
    - Ideal, Butterworth, Gaussian, Laplacian
  - **Selective filter**
    - Bandreject, bandpass, notch

Contents 3

- **Image Restoration**
  - **Noise model in spatial/frequency domain and its restoration**
  - **Degradation model**
  - **Inverse filtering**
    - Principle
    - Shortcoming and solutions
  - **Wiener Filter**

Contents 4

- **Color Image Processing**
  - **Color models**
    - RBG
    - CMY
    - HSI – Hue and saturation models
  - **Conversion between the color models**



Contents 5

- **Image Segmentation – Edge based methods**
  - Simple edge detection algorithm
    - Smooth, derivative, threshold
  - Marr-Hildreth
    - Gaussian filter, Laplacian, Zero crossing points
  - Canny's Algorithm
    - Gaussian filter, gradient (mag. & angle), nonmaxima suppression, hysteresis thretholds
- **Image Segmentation – Edge Linking**
  - Local (neibourhood connectivity),
  - regional (polygon approximation)
  - Global (Hough Transform)

Contents 6 (Not included)

- **Image Segmentation – Thresholding**
  - Basic Global Thresholding
  - Optimum Global Thresholding Using Otsu's Method
    - maximizing the between-class variance
- **Image Segmentation – Region Based Segmentation**
  - Region growing
  - Split and merge

Formats

- Manually compute, e.g.,
  - Histogram related computation
  - Filtering related computation
  - Color model related computation, etc.
  - Edge detection computation
- Answer short questions, e.g.,
  - Principle of models, algorithms
  - Functions of steps in an algorithm
  - Advantage and disadvantage of algorithms, etc.
  - Solutions to a particular image processing problems