

## PROJECT 05-01

### Noise Generators

See Fig. 5.2 for the shapes and parameters of the following noise probability density functions.

- (a) Find (or develop) a program to add Gaussian noise to an image. You must be able to specify the noise mean and variance.
- (b) Find (or develop) a program to add salt-and-pepper (impulse) noise to an image. You must be able to specify the probabilities of each of the two noise components.

## PROJECT 05-02

### Noise Reduction Using mean Filters and median filters

- (a) Add salt-and-pepper noise to 'ckt-board-orig.tif', with  $P_a = P_b = 0.1$  and show the noised image
- (b) Program a  $5 \times 5$  median filtering on (a) and demonstrate the restored result
- (c) Further add Gaussian noise with specified mean and variance onto (a)
- (d) Apply  $5 \times 5$  Arithmetic Mean Filter, Geometric Mean Filter, Median Filter and Alpha-trimmed mean filter (adjusting the parameter  $d$  for your filter) on (c) respectively. Explain differences between your results
- (e) Using the image difference and histogram technology to access the the performance of Alpha-trimmed mean filter and the Median Filter during the step (d)

## PROJECT 05-03

### Noise Reduction adaptive median filters

- (a) Add salt-and-pepper noise to 'ckt-board-orig.tif', with  $P_a = P_b = 0.25$  and show the noised image
- (b) Apply  $7 \times 7$  median filtering on (a) and show the processed image
- (c) Design an adaptive median filter with maximum size of the subwindow as  $7 \times 7$  on (a) and show the processed image
- (d) Explain differences between your results.

## PROJECT 06-01

### Convert the RGB color image into gray image

- (a) Read the color image "top\_left\_flower.tif" in Matlab, you will obtain a 3-D array which denote the Red, Green and Blue component respectively.
- (b) Use the equation  $I = (R + G + B) / 3$  to calculate the intensity. This is actually a simple way to convert the RGB color image into a gray image.
- (c) Display the gray image.
- (d) Adjust the proportion of R, G and B and re-calculate intensity I. Comparing with the result from (b) and discover the best proportions.



## PROJECT 06-02 (选做)

### Intensity modification in color images

Now we wish to modify the intensity of the color image “Fig\_strawberries” by suppressing it with a scalar of  $k=0.7$  (which means  $I = 0.7 \cdot I$ ) in both RGB color model and CMY color model

- (a) Figure out how to suppress the intensity of the color image in RGB model according to PROJECT 06-01 and demonstrate the result
- (b) Figure out how to suppress the intensity of the color image in CMY model according to the relationship between RGB model and CMY model, and demonstrate the result

