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Image processing refers to a technique used to improve raw images obtained from cameras or daily life pictures for various applications.

Various techniques have been developed in this field over the last few decades. Most of the techniques have been developed for enhancing images received from unmanned spacecraft, space probes and military flights. Image processing systems have gained popularity due to powerful personal computers, large size memory devices and graphics software. Image processing involves various techniques including image representation, preprocessing, enhancement, restoration, data compression, etc.

An image is represented as a function of two real variables, $f(x,y)$, where f is the amplitude (e. g., brightness) of the image. The 2D image is divided into N rows and M columns. The points of row-column intersections are called pixels.

Image preprocessing includes scaling, rotation and mosaic. This technique is applied to change the scale of image representation for visual interpretation or to match the scales of two images. Each pixel is replaced by a block of 2×2 pixel with the same brightness value to magnify the image by a factor of 2. Image reduction involves selecting the average in 'mxm' block and displaying this average after rounding the resultant value. Image rotation is used in creating mosaics, image overlays, etc. One of the techniques is 3-pass shear rotation. Creating mosaics involves combining two or more images to form a single one.

Image enhancement is aimed to emphasize image characteristics for further analysis. It includes contrast, edge enhancement, noise filtering etc. Image enhancement is used in image analysis, feature extraction and image display. Quality enhancement techniques include noise filtering and histogram modification. Noise filtering is used to remove non-relevant information and noises from the image. The characteristics of the image are reflected by the histogram. Image characteristics can be modified by changing the histogram.

Image restoration involves removal or minimization of degradations in the image. This includes de-blurring of images and correction of geometric distortion caused by limitations of sensors or the environment.

Compression techniques are used for archiving image data, image data transfer on the network, etc. There are various techniques for lossy and lossless compressions. Wavelet techniques are used to achieve higher compression ratios with minimal loss of data.

