MUTHAYAMMAL ENGINEERING COLLEGE
(An Autonomous Institution)
(Approved by AICTE, New Delhi, Accredited by NAAC & Affiliated to Anna University)
Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.

MUST KNOW CONCEPTS

MKC

ECE

2021-22

Subject		19ECC17 –DIGITAL IMAGE PROCESSING		
S.No.	**Term**	**Notation (Symbol)**	**Concept / Definition / Meaning / Units / Equation / Expression**	**Units**
Unit-I : DIGITAL IMAGE FUNDAMENTALS				
1.	Image		An image may be defined as two dimensional light intensity function f(x, y) where x and y denote spatial co-ordinate and the amplitude or value of f at any point (x, y) is called intensity or grayscale or brightness of the image at that point.	-
2.	Dynamic Range		The range of values spanned by the gray scale is called dynamic range of an image. Image will have high contrast, if the dynamic range is high and image will have dull washed out gray look if the dynamic range is low.	-
3.	Brightness		Brightness of an object is the perceived luminance of the surround. Two objects with different surroundings would have identical luminance but different brightness.	-
4.	Tapered Quantization		If gray levels in a certain range occur frequently while others occurs rarely, the quantization levels are finely spaced in this range and coarsely spaced outside of it. This method is sometimes called Tapered Quantization.	-
5.	Contrast		It is defined as the difference in intensity between the highest and lowest intensity levels in an image	-
6.	Gray level		Gray level refers to a scalar measure of intensity that ranges from black to grays and finally to white	-
7.	Color model		A Color model is a specification of 3D-coordinates system and a subspace within that system where each color is represented by a single point	-
8.	Hardware oriented color models		1. RGB model 2. CMY model 3. YIQ model 4. HSI model	-

9.	Hue & saturation		Hue is a color attribute that describes a pure color where saturation gives a measure of the degree to which a pure color is diluted by white light	-
10.	Applications of color models		1. RGB model--- used for color monitor & color video camera 2. CMY model---used for color printing 3. HIS model----used for color image processing 4. YIQ model---used for color picture transmission	-
11.	Resolution		Resolution is defined as the smallest number of discernible detail in an image. Spatial resolution is the smallest discernible detail in an image and gray level resolution refers to the smallest discernible change is gray level	-
12.	Pixel		A digital image is composed of a finite number of elements each of which has a particular location or value. These elements are referred to as pixels or image elements or picture elements or pels elements	-
13.	Digital image		When x, y and the amplitude values of f all are finite discrete quantities, we call the image as digital image	-
14.	Steps involved in DIP		1. Image Acquisition 2. Preprocessing 3. Segmentation 4. Representation and Description 5. Recognition and Interpretation	-
15.	Recognition and Interpretation		Recognition means is a process that assigns a label to an object based on the information provided by its descriptors. Interpretation means assigning meaning to a recognized object	-
16.	Elements of DIP system		1. Image Acquisition 2. Storage 3. Processing 4. Display	-
17.	Categories of digital storage		1. Short term storage for use during processing. 2. Online storage for relatively fast recall. 3. Archival storage for infrequent access	-
18.	Types of light receptors		The two types of light receptors are Cones and Rods	-
19.	Subjective brightness and Brightness adaptation		Subjective brightness means intensity as preserved by the human visual system. Brightness adaptation means the human visual system can operate only from scotopic to glare limit. It cannot operate over the range simultaneously. It accomplishes this large variation by changes in its overall intensity	-
20.	Weber ratio		The ratio of increment of illumination to background of illumination is called as weber ratio.(ie) $\Delta i/i$ If the ratio ($\Delta i/i$) is small, then small percentage of change in intensity is needed (ie) good brightness	-

			adaptation. If the ratio (Δi/i) is large , then large percentage of change in intensity is needed (ie) poor brightness adaptation	
21.	Illumination and reflectance		Illumination is the amount of source light incident on the scene. It is represented as i(x, y). Reflectance is the amount of light reflected by the object in the scene. It is represented by r(x, y)	-
22.	Zooming of digital images		Zooming may be viewed as over sampling. It involves the creation of new pixel locations and the assignment of gray levels to those new locations	-
23.	Luminance		Luminance measured in lumens (lm), gives a measure of the amount of energy an observer perceiver from a light source.	-
24.	Image Transform		An image can be expanded in terms of a discrete set of basis arrays called basis images. These basis images can be generated by unitary matrices. Alternatively, a given NxN image can be viewed as an N^2x1 vectors. An image transform provides a set of coordinates or basis vectors for vector space	-
25.	Applications of transform		1) To reduce band width 2) To reduce redundancy 3) To extract feature.	-
UNIT II – IMAGE ENHANCEMENT				
26.	Image enhancement technique		The objective of enhancement technique is to process an image so that the result is more suitable than the original image for a particular application	-
27.	2 categories of image enhancement		i) Spatial domain refers to image plane itself & approaches in this category are based on direct manipulation of picture image. ii) Frequency domain methods based on modifying the image by Fourier transform.	-
28.	Contrast stretching		Contrast stretching reduces an image of higher contrast than the original by darkening the levels below m and brightening the levels above m in the image	-
29.	Grey level slicing		Highlighting a specific range of grey levels in an image often is desired. Applications include enhancing features such as masses of water in satellite imagery and enhancing flaws in x-ray images	-
30.	Image subtraction		The difference between 2 images f(x,y) and h(x,y) expressed as g(x,y)=f(x,y)-h(x,y) is obtained by computing the difference between all pairs of corresponding pixels from f and h	-
31.	Image averaging		An important application of image averaging is in the field of astronomy,	-

			where imaging with very low light levels is routine, causing sensor noise frequently to render single images virtually useless for analysis	
32.	Masking		Mask is the small 2-D array in which the values of mask co-efficient determines the nature of process. The enhancement technique based on this type of approach is referred to as mask processing.	-
33.	Histogram		The histogram of a digital image with gray levels in the range [0, L-1] is a discrete function h(rk)=nk. rk-kth gray level; nk-number of pixels in the image having gray level rk.	-
34.	Median filter		The median filter replaces the value of a pixel by the median of the gray levels in the neighborhood of that pixel	-
35.	Spatial filtering		Spatial filtering is the process of moving the filter mask from point to point in an image. For linear spatial filter, the response is given by a sum of products of the filter coefficients, and the corresponding image pixels in the area spanned by the filter mask	-
36.	Maximum filter and Minimum filter		The 100^{th} percentile is maximum filter is used in finding brightest points in an image. The 0^{th} percentile filter is minimum filter used for finding darkest points in an image.	-
37.	Sharpening filters		1. Electronic printing and medical imaging to industrial application 2. Autonomous target detection in smart weapons.	-
38.	Types of derivative filters		1. Perwitt operators 2. Roberts cross gradient operators 3. Sobel operators	-
39.	Types of noise models		1. Guassian noise 2. Rayleigh noise 3. Erlang noise 4. Exponential noise 5. Uniform noise 6. Impulse noise	-
40.	Possible ways for adding noise in images		Image sensors, scanners, image acquisition, modify the pixel values, changing the background or foreground of an image, addition of two images, arithmetic operations between two images and image processing algorithms are the possible ways for adding noise in images.	-
41.	Spatial averaging		Spatial averaging is the process of finding out average of a center pixel and its neighbors. For linear spatial averaging, the response is given by a sum of products of the average filter mask, and the corresponding image pixels in the area spanned by the filter mask	-

42.	Harmonic mean filter		The harmonic filter operation is given by This filter is working well for salt noise but fails for pepper noise	-
43.	Transfer function of contraharmonic filter		The contraharmonic filter is used to reduce salt and pepper noise.	-
44.	RGB Color model		The RGB color model is an additive color model in which the red, green, and blue primary colors of light are added together in various ways to reproduce a broad array of colors. The name of the model comes from the initials of the three additive primary colors, red, green, and blue	-
45.	HSV Color model		HSV is a cylindrical color model that remaps the RGB primary colors into dimensions that are easier for humans to understand. Like the Munsell Color System, these dimensions are hue, saturation, and value. Hue specifies the angle of the color on the RGB color circle	-
46.	DFT		The Fourier Transform is an important image processing tool which is used to decompose an image into its sine and cosine components. The output of the transformation represents the image in the Fourier or frequency domain, while the input image is the spatial domain equivalent.	-
47.	DCT		The discrete cosine transform (DCT) represents an image as a sum of sinusoids of varying magnitudes and frequencies. The dct2 function computes the two-dimensional discrete cosine transform (DCT) of an image.	-
48.	Walsh Transform		The Walsh-Hadamard transform is a non-sinusoidal, orthogonal transform widely used in signal and image processing. In this transform, the signal is decomposed into a set of basis functions (similar to harmonics in Fourier). These basis functions are the Walsh functions, rectangular or square waves with +1 or -1	-
49.	KL Transform		The KL Transform is also known as the Hoteling transform or the Eigen Vector transform. The KL Transform is based on the statistical properties of the image and has several important properties that make it useful for image processing particularly for image compression	-
50.	Relationship between pixels		An image is denoted by f(x,y) and p,q are used to represent individual pixels of the image	-

Unit-III : IMAGE RESTORATION & SEGMENTATION				
51.	Image Restoration		Restoration attempts to reconstruct or recover an image that has been degraded by using a clear knowledge of the degrading phenomenon	-
52.	Properties in Linear Operator		1. Additivity 2. Homogenity	-
53.	Additivity property in Linear Operator		H[f1(x,y)+f2(x,y)]=H[f1(x,y)]+H[f2(x,y)] The additive property says that if H is the linear operator, the response to a sum of two is equal to the sum of the two responses.	-
54.	Homogenity property in Linear Operator		H[k1f1(x,y)]=k1 H[f1(x,y)] The homogeneity property says that, the response to a constant multiple of any input is equal to the response to that input multiplied by the same constant.	-
55.	Algebraic approach		The concept of algebraic approach is to estimate the original image which minimizes a predefined criterion of performances.	-
56.	Two methods of algebraic approach		1. Unconstraint restoration approach 2. Constraint restoration approach	-
57.	Gray-level interpolation		Gray-level interpolation deals with the assignment of gray levels to pixels in the spatially transformed image	-
58.	Noise probability density function		The spatial noise descriptor is the statistical behavior of gray level values in the noise component of the model	-
59.	Geometric transformation		Transformation is used to alter the co-ordinate description of image. The basic geometric transformations are 1. Image translation 2. Scaling 3. Image rotation	-
60.	Image translation and scaling		Image translation means reposition the image from one co-ordinate location to another along straight line path. Scaling is used to alter the size of the object or image (i.e) a co-ordinate system is scaled by a factor.	-
61.	Unconstrained restoration		In the absence of any knowledge about the noise ‘n’, a meaningful criterion function is to seek an such that H approximates of in a least square sense by assuming the noise term is as small as possible. Where H = system operator. = estimated input image. g = degraded image.	-
62.	Spatial relocation of pixels		The point is the most frequent method, which are subsets of pixels whose location in the input (distorted) and output (corrected) imaged is known precisely.	-
63.	Estimating the degradation function		1. Observation 2. Experimentation 3. Mathematical modeling. The simplest approach to restoration is direct inverse	-

			filtering, an estimate F^(u,v) of the transform of the original image simply by dividing the transform of the degraded image G^(u,v)	
64.	Rubber sheet transformation		Geometric transformations may be viewed as the process of printing an image on a rubber sheet and then stretching the sheet according to some predefined set of rules .Therefore they are also called as rubber sheet transformations	-
65.	Lagrange multiplier		The Lagrange multiplier is a strategy for finding the local minima and maxima of a function subject to equality constraints. This is mainly used in the image restoration process like image acquisition, image storage and transmission.	-
66.	Blur in image		The blur is caused by lens that is improper manner, relative motion between camera and scene and atmospheric turbulence. It will introduce bandwidth reduction and make the image analysis as complex. To prevent the issues, blur is removed from the images.	-
67.	Bit plane slicing		Instead of highlighting gray level ranges, highlighting the contribution made to total image appearance by specific bits might be desired. Suppose that each pixel in an image is represented by 8 bits. Imagine that the image is composed of eight 1-bit planes, ranging from bit plane 0 for LSB to bit plane-7 for MSB.	-
68.	Formula for negative and log transformation		Negative: S=L-1-r; Log: S = c log(1+r) Where c-constant and ≥ 0	-
69.	Image Negatives		The negative of an image with gray levels in the range [0, L-1] is obtained by using the negative transformation, which is given by the expression. s = L-1-r Where s is output pixel r is input pixel	-
70.	Point processing		Image enhancement at any Point in an image depends only on the gray level at that point is often referred to as Point processing	-
71.	Difference between Enhancement and Restoration		Enhancement technique is based primarily on the pleasing aspects it might present to the viewer. For example: Contrast Stretching. Whereas Removal of image blur by applying a deblurrings function is considered a restoration technique.	-
72.	Indirect estimation		Indirect estimation method employ temporal or spatial averaging to either obtain a restoration or to obtain key elements of an image restoration algorithm	-
73.	Blur impulse response		This parameter is measured by isolating an image of a suspected object within a picture	-

74.	Noise levels		The noise of an observed image can be estimated by measuring the image covariance over a region of constant background luminence	-
75.	Algebraic approach		The concept of algebraic approach is to estimate the original image which minimizes a predefined criterion of performances.	
Unit-IV : WAVELETS AND IMAGE COMPRESSION				
76.	Image compression		Image compression refers to the process of redundancy amount of data required to represent the given quantity of information for digital image. The basis of reduction process is removal of redundant data.	-
77.	Data Compression		Data compression requires the identification and extraction of source redundancy. In other words, data compression seeks to reduce the number of bits used to store or transmit information.	-
78.	Types of Data compression		1. Lossless compression can recover the exact original data after compression. It is used mainly for compressing database records, spreadsheets or word processing files, where exact replication of the original is essential. 2. Lossy compression will result in a certain loss of accuracy in exchange for a substantial increase in compression. Lossy compression is more effective when used to compress graphic images and digitized voice where losses outside visual or aural perception can be tolerated.	-
79.	Need for Compression		In terms of storage, the capacity of a storage device can be effectively increased with methods that compress a body of data on its way to a storage device and decompress it when it is retrieved. 1. In terms of communications, the bandwidth of a digital communication link can be effectively increased by compressing data at the sending end and decompressing data at the receiving end. 2. At any given time, the ability of the Internet to transfer data is fixed. Thus, if data can effectively be compressed wherever possible, significant improvements of data throughput can be achieved. Many files can be combined into one compressed document making sending easier	-
80.	Different Compression Methods		Run Length Encoding (RLE) Arithmetic coding Huffman coding and Transform coding	-

81.	Interpixel redundancy		The value of any given pixel can be predicted from the values of its neighbors. The information carried by is small. Therefore the visual contribution of a single pixel to an image is redundant. Otherwise called as spatial redundant geometric redundant or inter pixel redundant. Eg: Run length coding	-
82.	Run length coding		Run-length Encoding or RLE is a technique used to reduce the size of a repeating string of characters. This repeating string is called a run; typically RLE encodes a run of symbols into two bytes, a count and a symbol. RLE can compress any type of data regardless of its information content, but the content of data to be compressed affects the compression ratio. Compression is normally measured with the compression ratio	-
83.	Compression ratio		Compression Ratio = original size / compressed size	-
84.	Wavelet Transform		A major disadvantage of the Fourier Transform is it captures *global* frequency information, meaning frequencies that persist over an entire signal. This kind of signal decomposition may not serve all applications well, for example Electrocardiography (ECG) where signals have short intervals of characteristic oscillation. An alternative approach is the Wavelet Transform**,** which decomposes a function into a set of wavelets	-
85.	Wavelet		A Wavelet is a wave-like oscillation that is localized in time, an example is given below. Wavelets have two basic properties: scale and location. Scale (or dilation) defines how “stretched” or “squished” a wavelet is. This property is related to frequency as defined for waves. Location defines where the wavelet is positioned in time (or space).	-
86.	Source encoder		Source encoder performs three operations 1) Mapper -this transforms the input data into non-visual format. It reduces the interpixel redundancy. 2) Quantizer - It reduces the psycho visual redundancy of the input images .This step is omitted if the system is error free. 3) Symbol encoder- This reduces the coding redundancy .This is the final stage of encoding process.	-
87.	Channel encoder		The channel encoder reduces the impact of the channel noise by inserting redundant bits into the source encoded data. Eg: Hamming code	-

88.	Types of decoder		Source decoder- has two components a) Symbol decoder- This performs inverse operation of symbol encoder. b) Inverse mapping- This performs inverse operation of mapper. Channel decoder-this is omitted if the system is error free.	-
89.	Variable Length Coding		Variable Length Coding is the simplest approach to error free compression. It reduces only the coding redundancy. It assigns the shortest possible codeword to the most probable gray levels.	-
90.	Huffman coding		1. Huffman coding is a popular technique for removing coding redundancy. 2. When coding the symbols of an information source the Huffman code yields the smallest possible number of code words, code symbols per source symbol. Limitation: For equiprobable symbols, Huffman coding produces variable code words	-
91.	Region growing		Region growing is a procedure that groups pixels or subregions in to layer regions based on predefined criteria. The basic approach is to start with a set of seed points and from there grow regions by appending to each seed these neighbouring pixels that have properties similar to the seed.	
92.	Local threshold		If Threshold T depends both on f(x,y) and p(x,y) is called local.	
93.	Adaptive threshold		If Threshold T depends on the spatial coordinates x and y the threshold is called dynamic or adaptive where f(x,y) is the original image.	
94.	Hough transform		The edges are linked through hough transform by using intersecting of 2 lines equations. The straight line equation is $y = mx+b$. In polar coordinates $\rho=x\cos\theta+y\sin\theta$ where ρ & θ are the coordinates of parameter space. The hough transform of a straight line in the x,y space is a single point in ρ,θ space.	
95.	Region splitting and merging		Region splitting and merging is a segmentation process in which an image is initially subdivided into a set of arbitrary ,disjoint regions and then the regions are merger and /or splitted to satisfy the basic conditions.	
96.	Coding systems in JPEG		1. A lossy baseline coding system, which is based on the DCT and is adequate for most compression application. 2. An extended coding system for greater compression, higher precision or progressive reconstruction applications. 3. A lossless	

			independent coding system for reversible compression	
97.	JPEG		The acronym is expanded as "Joint Photographic Expert Group". It is an international standard in 1992. It perfectly Works with color and grayscale images, Many applications e.g., satellite, medical.	
98.	MPEG		The acronym is expanded as "Moving Picture Expert Group". It is an international standard in 1992. It perfectly Works with video and also used in teleconferencing	
99.	P-frame		P-frame is called predictive frame. A P-frame is the compressed difference between the current frame and a prediction of it based on the previous I or P-frame	
100.	B-frame		B-frame is the bidirectional frame. A B-frame is the compressed difference between the current frame and a prediction of it based on the previous I or P-frame or next P-frame. Accordingly the decoder must have access to both past and future reference frames.	
Unit-V : IMAGE REPRESENTATION AND RECOGNITION				
101.	Region representation		- based on external characteristics (its boundary) - based on internal characteristics (pixels comprising the region)	
102.	Region description		- boundary descriptors, such as boundary length, diameter, curvature, etc. - regional descriptors, such as area, perimeter, compactness, mean value, etc	-
103.	Chain codes		represent a boundary by a connected sequence of straight-line segments of specified length and direction	-
104.	Polygonal approximations		a digital boundary can be approximated by a polygon minimum perimeter polygons - enclose a boundary by a set of concatenated cells and produce a minimum perimeter that fits the cell strip	-
105.	Merging		merge points along a boundary until the least square error line fit of the points merged exceeds a preset threshold; repeat the procedure for the new points along the boundary; at the end of the procedure the intersections of adjacent line segments form the vertices of the polygon	-
106.	Splitting		subdivide a segment successively into two parts until a given criterion is satisfied -- for example, a requirement might be that the maximum perpendicular distance from a boundary segment to the line joining two	-

			end points does not exceed a preset threshold	
107.	Signatures		• a simple functional representation that can be used to describe and reconstruct the boundary with appropriate accuracy • the simplest signature is a plot of the distance from the centroid to the boundary as a function of angle:	-
108.	Boundary segments		The region boundary can be partitioned by following the contour of S and marking the points at which a transition is made into or out of a component of the convex deficiency	-
109.	The skeleton of a region		MAT algorithm: (1) for each point in the region we find its closest point in boundary, (2) if a point has more than one such a neighbor --> a point belongs to the medial axis (skeleton) of the region	-
110.	Topological descriptors		topology - the study of properties of a figure that are unaffected by any deformation except tearing or folding	-
111.	Texture		Texture, as observed in wood grain, stone, cloth, grass, etc., is an important region description No formal definition; intuitively this descriptor provides measures of properties, such as smoothness, coarseness, regularity, etc.	-
112.	statistical		smoothness, coarseness, graininess (using moments, entropy, etc.)	-
113.	structural		arrangement of image primitives, such as regularity of parallel lines	-
114.	spectral		based on properties of Fourier spectrum (periodic patterns in an image)	-
115.	Morphology		Morphological operators - tools for extracting image components that are useful in the representation and description of region shape (examples: erosion, dilation, etc.)	
116.	Erosion		removes pixels from the periphery of a region (it also removes single pixels)	
117.	Dilation		adds a layer of pixels around a periphery of a region (it also fill small holes within regions)	
118.	set theory		The language of mathematical morphology is set theory	
119.	Opening		a combination of an erosion followed by a dilation (opening up the spaces between touching regions, removing pixels in regions which are too small to contain the structuring element)	
120.	Closing		a combination of an dilation followed by an erosion (fusing narrow brakes, eliminating small holes, filling gaps smaller than the	

			structuring element)	
121.	Shape factor		Perimeter2/Area	
122.	Neural Network based classifier		Neural networks are complex models, which try to mimic the way the human brain develops classification rules. A neural net consists of many different layers of neurons, with each layer receiving inputs from previous layers, and passing outputs to further layers	
123.	Perceptron		A perceptron is a neural network unit (an artificial neuron) that does certain computations to detect features or business intelligence in the input data.	
124.	Network Architecture		Network architecture is the design of a computer network. It is a framework for the specification of a network's physical components and their functional organization and configuration, its operational principles and procedures, as well as communication protocols used	
125.	Activation Function		The activation function is a non-linear transformation that we do over the input before sending it to the next layer of neurons or finalizing it as output. Types of Activation Functions – Several different types of activation functions are used in Deep Learning	
Placement Questions				
126.	Image		An Image may be defined as a two dimensional function f (x,y) where x & y are spatial (plane) coordinates, and the amplitude of f at any pair of coordinates (x,y) is called intensity or gray level of the image at that point. When x,y and the amplitude values of f are all finite, discrete quantities we call the image as Digital Image	-
127.	Image Sampling		Digitization of spatial coordinates (x,y) is called Image Sampling. To be suitable for computer processing, an image function f(x,y) must be digitized both spatially and in magnitude.	-
128.	Quantization		Digitizing the amplitude values is called Quantization. Quality of digital image is determined to a large degree by the number of samples and discrete gray levels used in sampling and quantization.	-
129.	Dynamic Range		The range of values spanned by the gray scale is called dynamic range of an image. Image will have high contrast, if the dynamic range is high and image will have	-

			dull washed out gray look if the dynamic range is low	
130.	Mach Band Effect		The spatial interaction of Luminance from an object and its surround creates a Phenomenon called the mach band effect	-
131.	Maximum Filter and Minimum Filter		The 100^{th} percentile is maximum filter is used in finding brightest points in an image. The 0th percentile filter is minimum filter used for finding darkest points in an image	-
132.	Median Filter		The Median filter replaces the value of a pixel by the median of the gray levels in the neighborhood of that pixel	-
133.	Averaging Filters		The output of a smoothing, linear spatial filter is the average of the pixels contain in the neighborhood of the filter mask. These filters are called averaging filters.	-
134.	Spatial Filtering		Spatial Filtering is the process of moving the filter mask from point to point in an image. For linear spatial filter, the response is given by a sum of products of the filter coefficients, and the corresponding image pixels in the area spanned by the filter mask	-
135.	Histogram		The Histogram of a digital image with gray levels in the range [0, L-1] is a discrete function h (rk) = nk, where rk is the kth gray level and nk is the number of pixels in the image having gray level rk.	-
136.	Masks or Kernels		A Mask is a two-dimensional array, in which the value of the mask coefficient determines the nature of the process, such as image sharpening	-
137.	Point Processing		Image Enhancement at any Point in an image depends only on the gray level at that point is often referred to as Point processing	-
138.	Image Enhancement		Image Enhancement is to process an image so that the output is more suitable for specific application	-
139.	Applications Of Dip		Remote Sensing, Image Transmission and storage, Medical Imaging and Astronomy	-
140.	KL Transforms		KL Transforms is an optimal in the sense that it minimizes the mean square error between the vectors X and their approximations X^. Due to this idea of using the Eigenvectors corresponding to largest Eigen values. It is also known as principal component transform.	-
141.	Haar Transforms		The Haar Transforms are defined on a continuous interval Xe [0,1] and for K=0,1,……. N-1.Where N=2^n. The integer k can be uniquely decomposed as K=2^P+Q-1	-

142.	Image Transform		An Image can be expanded in terms of a discrete set of basis arrays called basis images. Unitary matrices can generate these basis images. Alternatively, a given NXN image can be viewed as an N^2X1 vectors. An image transform provides a set of coordinates or basis vectors for vector space	-
143.	Luminance		Luminance measured in lumens (lm), gives a measure of the amount of energy an observer perceiver from a light source	
144.	Radiance		Radiance is the total amount of energy that flows from the light source, and it is usually measured in watts (w)	-
145.	Shrinking Of Digital Images		Shrinking may be viewed as under sampling. To shrink an image by one half, we delete every row and column. To reduce possible aliasing effect, it is a good idea to blue an image	-
146.	Point Processing		Image Enhancement at any Point in an image depends only on the gray level at that point is often referred to as Point processing	
147.	Mach Band Pattern		The intensity or brightness pattern perceive a darker stribe in region D and brighter stribe in region B.This effect is called Mach band pattern or effect	
148.	JPEG		The acronym is expanded as "Joint Photographic Expert Group". It is an international standard in 1992. It perfectly Works with color and grayscale images, Many applications e.g., satellite, medical.	
149.	Coding systems in JPEG		1. A lossy baseline coding system, which is based on the DCT and is adequate for most compression application. 2. An extended coding system for greater compression, higher precision or progressive reconstruction applications. 3. A lossless independent coding system for reversible compression.	
150.	Arithmetic coding		In arithmetic coding one to one corresponds between source symbols and code word doesn't exist where as the single arithmetic code word assigned for a sequence of source symbols. A code word defines an interval of number between 0 and 1.	

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