**UNIT – II IMAGE ENHANCEMENT**

**SESSION –1**

1. Introduction to image enhancement –Recall by key words

Digital image, color fundamentals, Pixels, Gray level, Transforms, Connectivity, Spatial domain. Frequency domain

1. Histogram Processing Histogram equalization –

Power point presentation. The necessity to perform Histogram processing is explained in these slides.

1. Histogram specification –

Power point presentation – some picture related to image enhancement was shown to students for identification.

1. Conclusion – Summarization by Learners.

We can randomly choose the learners and ask them to summarize the concepts learnt in the session.

Identify the necessity of image enhancement

Explain spatial domain operation like

Point processing

Histogram based techniques

Mask operations

Demonstrate Frequency domain operations.

**SESSION – 2**

1. Recap – Brainstorming Visuals – Sample questions could be:
2. Give the principle of Enhancement Techniques

2. Explain the types of it.

1. Noise distribution Gaussian noise Rayleigh noise – Visuals & PPT

The description of Gaussian noise, Rayleigh noise is explained with the help of power point presentation.

1. Uniform noise and Exponential noise – Visuals & PPT

The description of Uniform noise and Exponential noiseis explained with the help of power point presentation.

1. Impulse or salt and pepper noise – Visuals & PPT

The description of Impulse or salt and pepper noiseis explained with the help of power point presentation.

1. Periodic noise – Visuals & PPT

Identify the Picture

1. Identify the type of noise affected this tree image

Answer: Salt and pepper noise

1. Identify the type of noise affected this animal image

Answer: Gaussian

1. Identify the type of noise affected this noisy image

Answer: Random noise

1. Conclusion –See and Tell –

We can divide the learners into 4 groups and show an image to identify the different types of noise. The learners discuss among the team members and write the result on a stick – paper. One learner from the team can come forward and stick the paper on the board.

**SESSION – 3**

1. Recap – Quiz –

The entire class can be divided into different groups. May be each now is assumed as one group. Sample questions

What is image enhancement?

What is salt and pepper noise?

Write the PDF of Gaussian noise

1. Spatial averaging ,Image subtraction– Power Point Presentation and Visuals.

With the help of PPT the importance of Spatial averaging and image subtraction is described

1. Image Averaging – Power Point Presentation and Visuals

The description of Image Averagingis explained with the help of power point presentation

1. Basic of spatial filtering – Power Point Presentation and Visuals

With the help of PPT the importance of Basic of spatial filteringis described

1. Conclusion – Questions and Answer

Define the term Noise.

Classify the different types of noises.

Define the term Filter.

Outline the different types of Filters

Convert a good image to a noisy image.

Apply a filter to an image and verify the output.

**SESSION – 4**

1. Recap –Tit for Tat –

One from each group asks questions. Group – I will ask question to group – II and group – II to group – III so on.

Sample question

What is the purpose of image averaging?

Define image subtraction

1. Directional smoothing – Power Point Presentation and Visuals

The description of Directional smoothingis explained with the help of power point presentation

1. Low pass spatial filtering – Power Point Presentation and Visuals

The description of Low pass spatial filteringis explained with the help of power point presentation

1. Conclusion – Questions and Answer.

Sample Questions

Define directional smoothing.

What is meant by spatial filtering

**SESSION-5**

1. Recap – Unspoken Word:

We can give some clues related to the filters and ask the learners to identify and write that types of filters on the board.

* Used in the field of astronomy
* Blurring and noise reduction
* Averaging filters

1. Median filters Max and min filter Midpoint filters –

Power Point Presentation

[www.comp.dit.ie/bmacnamee/.../ImageProcessing7-](http://www.comp.dit.ie/bmacnamee/.../ImageProcessing7-)

FrequencyFiltering.p...‎

1. Mean filters – Arithmetic filter – Power Point Presentation
2. Geometric mean filters – Power Point Presentation and Visuals
3. Conclusion – Questions and Answer

Give the expression for arithmetic mean filter

What is order statistic filter?

Give the expression for max and min filter.

**SESSION – 6**

1. Recap – Brainstorming sample questions could be:-

* Which filter eliminates bipolar noise?
* Reduction of pepper noise
* Reduction of salt noise

1. Harmonic filters – Power Point Presentation

www2.units.it/ramponi/teaching/DIP/materiale/dip05.pdf‎

1. Contra harmonic filters – Power Point Presentation

www.comp.dit.ie/bmacnamee/.../ImageProcessing5-SpatialFiltering1.ppt‎

1. Conclusion – Guess What I am

To conduct this activity, we can divide the class into four groups. Hints can be given one by one about the word discussed in this session. Learners can have internal discussion among the groups and guess the word. The group that first comes up with the correct guess using lesser number of hints can be given 5 points. This can be repeated for all the hints and finally, the groups with maximum points can be awarded.

The following hints can be given to the learners:-

1. Hint – 1: I am due to electrical or electromechanical interference during image acquisition.

Hint – 2: I can only be eliminated in frequency domain

Hint – 3: I look like dots in frequency domain

Hint – 4: I have a relation with moiré patterns

1. Hint – 1: I work well for eliminating salt noise

Hint – 2: I am not an order statistic filter

Hint – 2: I fail for pepper noise

1. Word – 1 : Periodic noise
2. Word – 2 : Harmonic mean filter

**SESSION – 7**

1. Recap – Brainstorming – Sample questions could be:-

Differentiate harmonic and contra harmonic filters

What is pepper and salt noise

1. Homomorphic filter – Power Point Presentation. This power point presentation describes the concept of homomorphic filtering.

www.ece.iastate.edu/~namrata/EE528\_Spring07/ImageRestoration1.pdf‎

www.csie.ntpu.edu.tw/~dalton/course/DIP/lecture/Chapter10.pdf‎

www2.units.it/ramponi/teaching/DIP/materiale/dip05.pdf‎

1. Conclusion – See and Tell.

Picturs can be shown to identify the type of noise and choose the corresponding noise.

**SESSION – 8**

1. Recap – Questions and Answers

We can divide the learners in the class into two groups. Each group should prepare nearly 10 questions and answers from the concepts which they learnt from this session. One representation from each group should pose a question to the other group. The other group learners are also asked to follow the same.

The sample question and answers could be as follows:

1. Inter Noise

Answer: The unwanted signal

1. Outline an image

Answer: It is the photographic output and it is two dimensional

1. Sharpening filters – Power Point Presentation

www.comp.dit.ie/bmacnamee/.../ImageProcessing6-SpatialFiltering2.ppt‎

1. Basic high pass spatial filtering – Power Point Presentation

[www.comp.dit.ie/bmacnamee/.../ImageProcessing7-FrequencyFiltering.p](http://www.comp.dit.ie/bmacnamee/.../ImageProcessing7-FrequencyFiltering.p)..

www.csie.ntnu.edu.tw/~violet/IP93/Chapter04.ppt‎

1. Conclusion – Summarization by Learners

Define the term Noise

Classify the different types of noises.

Define the term Filter.

Outline the different types of Filters.

Convert a good image to a noisy image.

Apply a filter to an image and verify the outputs.

**SESSION – 9**

1. Recap – Brainstorming –

The entire class can be divided into different groups. May be each now is assumed as one group. Sample questions.

What is the purpose of sharpening filter?

What is mask?

1. False and pseudo color – Power Point Presentation

www.comp.dit.ie/.../dip/.../ImageProcessing12-ColourImageProcessing.p...‎

1. Pseudo color image enhancement - Power Point Presentation

hpourreza.profcms.um.ac.ir/imagesm/196/stories/dip/.../ch06-color2.ppt‎

1. Color image enhancement – Power Point Presentation

eeweb.poly.edu/~yao/EE3414/image\_color.pdf

‎Conclusion – Word

O C L O D L P C CC E O T Q I

A I R C H F H E O R N G N A

S H A R P E N I N G Z E V W E

C P M E D I A N T B N U U G Z

H R A D G A A E R H K C L C C

I M N O I T A D A R G E D I R

S O B A L Y J N H A A Y N E N

T M N J T Q C Y O O U O T Z A

O OO A N E Z Q R Q M L A K I

G H S O M Q Q A M R L P V P S

R R E E T T E G O F C L A C S

A N NN E H V H N Y M W G J U

M T I Y L U I A I J G K P I A

M O R Q F W E N C M Z A A L G

G G T N L M M R G F F U E R F

CONTRAHORMONIC DEGRADATION ENCHANCEMENT

GAUSSIAN HISTOGRAM HOMOMRPHIC

HORMONIC MEANFILTER MEDIAN

SHARPENNING SMOOTHING