UNIT – III IMAGE RESTORTATION

SESSION – 1

1. Recap –Image enhancement – Pictorial Quiz. To conduct this activity, we can divide the class into four groups. Different images can be shown to learners. One minute of time can be given to the learners for internal discussion and answer the question.

We can show the following images to the learners:

1. First image shown is the test image which has been corrupted as shown in second image. Identify the noise.
2. Identify the noise which has the probability density function shown below
3. If the histogram of an image is as shown below, identify the noise that has been added to the image
4. Identify the noise which has this skewed PDF
5. If the histogram of an image is as shown below, identify the noise that has been added to the image.
6. Impulse Noise
7. Uniform Noise
8. Exponential Noise
9. Gamma Noise
10. Rayleigh Noise
11. Introduction to image restoration – Brainstorming –

List of ideas contributed by the students on Image Restoration is summarized by the facilitator.

1. Comparison of image enhancement and image restoration – Power Point Presentation

www.comp.dit.ie/bmacnamee/.../dip/.../ImageProcessing1-Introduction.p...‎

1. Introduction to degradation function – Power Point Presentation

www-ee.uta.edu/dip/Courses/EE5351/Image\_Restoration.ppt‎

1. Conclusion –

Learner led presentation. Summary of the session can be asked to present by a learner.

SESSION – 2

1. Recap – Question and Answer
* Compare image enhancement and image restoration
* What are the different degradation models?
* What is degradation?
* What is circulantmatrix?
1. Degradation model for continuous function – Chalk and Talk –

Expression for continuous degradation

1. Degradation model for discrete function – Chalk and Talk –

 Expression for discrete function

4.Conclusion and Summary – Questions and Answers

* What is circulant matrix?
* Write the equation for continuous function
* Write the equation for discrete function in two dimensions.

SESSION – 3

1. Recap –Brainstorming –

Brainstorming is carried out by posing different questions

What is degradation?

Write the degradation equation for discrete function

1. Algebraic approach of restoration – Presentation slides

users.rowan.edu/~shreek/fall09/dip/lectures/lecture6.ppt‎

web.eecs.utk.edu/~qi/ece472-572/lecture08\_restoration\_deblur.ppt‎

1. Unconstrained restoration:Chalk and Talk Presentation. The derivation and characteristics of unconstrained restoration is explained.
2. Conclusion and Summary – Summarization by Learners – We can conclude by summarizing the whole session – Algebraic approach is used to estimate the image degradation,Seeking of approximate value of the original image.

SESSION – 4

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 unconstrained restoration?

List the algebraic approaches used for restoration?

Give the equation for continous and discrete degradation function?

1. Language multiplier – PPT Chalk and Talk

The derivation and characteristics of Language multiplieris explained.

www.tcc.edu/VML/Mth163/documents/LagrangeMultipliersNew2.ppt‎

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

1. Conclusion and Summary – Summarization by learners

We introduce a computational method, based on algorithm of Lagrange multi-pliers, to restore an image that has been blurred by uniform linear motion. We are motivated by the problem of restoring blurry images via well developed mathematical methods and techniques based on the Lagrange multipliers in order to obtain an approximation of the original image.

SESSION – 5

1. Recap – Questions and Answers

What is Lagrange multiplier?

Why Lagrange multiplier is used in image restoration?

1. Constrained restoration Chalk and Talk Presentation

The derivation and characteristics of Constrained restorationis explained.

csce.uark.edu/~jgauch/5683/notes/ch05c.pdf‎

math.ewha.ac.kr/~jylee/SciComp/dip-diml.yonsei/chap5-1.pdf‎

1. Conclusion and Summary – Board activity

Write the matrix notation for smoothing.

Write the procedure for constrain least square restoration.

SESSION – 6

1. Recap – Recall by key word

Unconstraint restoration, constraint restoration, smoothing matrix, procedure for constraint least square filter

1. Inverse filtering formulation – Chalk and Talk Presentation

The derivation of Inverse filtering is explained and its importance is stated.

www-ee.uta.edu/dip/Courses/EE5351/Image\_Restoration.ppt

1. Removal of blur caused by uniform linear motion – Chalk and Talk Presentation.

The derivation of Removal of blur caused by uniform linear motionis explained and its importance is stated.

faculty.petra.ac.id/resmana/private/pcd/presentation/lecture6.ppt

1. Conclusion and Summary – Summarization by learners
* Recall the degradation model:

Given H(u,v), one may directly estimate the original image

At (u,v) where H(u,v) = 0, the noise N(u,v) term will be amplified

SESSION – 7

1. Recap – Questions and Answers
* How will you remove the blur caused by uniform motion?
* Write the expression for inverse filtering
* What are the disadvantages of inverse filtering?
* Define inverse filtering.
* What is the advantage of inverse filtering?
1. Least mean square (WIENER) filter Chalk and Talk Presentation

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

www.postech.ac.kr/~seungjin/courses/ml/handouts/handout15\_4pp.pdf‎

1. Conclusion and Summary – Summarization by learners
* Iterative wiener filter is an effective method to estimate the power spectral density of the original image.
* The mean square error decreases with the number of iterations increasing until it converges.

SESSION – 8

1. Recap – Review – Assumptions of Wiener filter
* The original image and noise are stoically independent
* The power spectral density of the original image and noise are known.
* Both the original image and noise are zero mean.
1. Geometric Transformation – Chalk and Talk Presentation

www.postech.ac.kr/~seungjin/courses/ml/handouts/handout15\_4pp.pdf‎

jc-schools.net/ppt/GeometricTransformations.ppt‎

1. Conclusion and Summary – Question and Answer

What is geometric transformation?

What are the types if geometric transformation?

SESSION – 9

1. Recap – See and Tell
2. Original image
3. Distorted image using bilinear transform
4. Difference between a and B
5. Geometrically restored image using bilinear transform for gray level interpolation
6. Spatial Transformation Chalk and Talk Presentation

www.cs.bgu.ac.il/.../Intensity%20Transformation%20and%20Spatial%20...‎www.csie.ntnu.edu.tw/~violet/IP93/Chapter03.ppt‎

1. Gray level Interpolation Chalk and Talk Presentation

elect.eng.ankara.edu.tr/courses/.../Lec-4%20Restoration-Deconvolution.p...

1. Conclusion and Summary – Cross word

Across

4. Rubber sheet transformation

7. Salt and pepper noise

1. The filter removes salt noise only
2. One of the type of geometric transformation
3. Removes both salt and pepper noise

Down

1. Reconstruction of an image
2. Minimum mean square error filter
3. Filter that smoothes local degradation of image’
4. Falls to handle noise