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| INFORMACIÓN BÁSICA | |
| NOMBRE DE LA PRÁCTICA: **Laboratorio: Segmentación y mejora de imagen.** | PRÁCTICA No.:2 |
| **ASIGNATURA:**  *Digital image processing* | |
| **TEMA DE LA PRÁCTICA:**  *Basic statistic, brightness and contrast manipulation.* | |
| LABORATORIO A UTILIZAR: Laboratorio de informática | |
| **CONTENIDO DE LA GUÍA**  *(Para elaborar por el Docente)* | |
| **OBJETIVES.**   * *To understand the basics of statistic in digital image processing* * *To apply techniques of contrast and brightness manipulation.* * *To understand the basis of image enhancement.* | |
| **INTRODUCTION.**  The Biomedical engineering provides assist for medical diagnosis techniques based on medical information from different modalities like medical images.  The medical Images are defined as the set of techniques and process to obtain human body images with clinical relevancy. Different types of diseases are only revealed to medic when he analyze the information from a clinical image, but some signs of illness are difficult to see or need a especial processing to reveal the relevant information. | |
| **THEORETICAL FRAMEWORK**  Quality enhacement  Consists in a set of operations to reveal or restore details in the image of a particular application. Thus for example a method to enhance X-ray images is not particularly useful to ultrasound images.  Image enhancement can be divided in two main currents, spatial domain and frequency domain methods | |
| **PREVIOUS KNOWLEDGE**     1. *Read about normal, Rayleigh and exponential distributions.* 2. *Read about the* concept of look up table. 3. *Read about the concept o gamma correction and contrast.* 4. *Frequency domain transformations.* 5. *Concept of background and in front objects.* 6. *Filters in spatial domain.* 7. *Noise in spatial domain.* 8. *Pseudo color processing.* | |
| **METHODOLOGY**   1. *Extract statistic information from image.* 2. *Enhancement of contrast and brightness.* 3. *Effects of noise and filtering.* 4. *Pseudo color highlight.* | |
| **MATERIALS**   |  |  |  | | --- | --- | --- | | **Materials** | **Extras** | **Estudent Materials** | | **Matlab** |  |  | | **Image procesing toolbox** |  |  | |  |  |  |   **PRECAUTIONS AND MATERIAL MANAGEMENT.**  **- Please take care of the computer assigned to you.**  **- Please do not enter food an liquids.**  **- Please do not enter your bagpack.** | |
| **Process to apply**  *PART ONE (Statistic information )*   1. *Load the sample image (mri.tif) in matlab and assign it to a variable.* 2. *Extract the basic information from the image.*   *Exercises:*   1. *Compute the probability distribution of brightnesses.* 2. *Compute the density probability function of brightnesses.* 3. *Normalize the image between 0 and 1 values.* 4. *Normalize the image between -1 and 1.* 5. *Calculate the average value of brightness from the complete image.* 6. *Compute the average value of neighborhood region of 9 x 9 in a sliding window over the image and store each value in an array of mean values.* 7. *Compute the average from the brightness histogram.* 8. *Compute the standard deviation from the image and using the histogram information.* 9. *Compute the coefficient of variation.* 10. *Compute the signal noise to ratio SNR from the image.*   ***Part –two(Contrast and brightness enhancement)***   1. *Load a mammography image from the mini MIAS data set disponible.*   *Exercises:*   1. *Ecualize the histogram of the image and show the results.* 2. *Use an adaptative ecualization (clahe) to adjust the following distributions: Exponential, Rayleight and Gaussian.* 3. *With a LUT calculate a Gaussian function and apply it.* 4. *With a LUT apply the exponential, lineal and gamma corrections.* | |
| **BIBLIOGRAFÍA RECOMENDADA.**  Application of Fourier analysis to the visibility of gratings.  Campbell, F. W. & Robson, J. G. (1968).. Journal of Physiology **197** (3): 551–566.  Digital Image Processing  Rafael C. Gonzales, Richard E. Woods. Third edition, Prentice Hall, Pearson. 2008.  *The Image Processing Handbook*  *Jhon C. Russ. Sixth Edition, CRC press,2011.* *Digital Image Processing Using MATLAB* Rafael C. Gonzales, Richard E. Woods. Second edition, Gatesmark Publishing; 2009.  *-----------------------------------------------------------------------------------------------------------------------------*  *Tutorials Point simple easy learning, Digital image processing, Web page, <http://www.tutorialspoint.com/dip/index.htm>, seeing 22/06/16*  Statistics in image processing, Web page  <http://www.mif.vu.lt/atpazinimas/dip/FIP/fip-Statisti.html>, seeing 24/06/2016 | |
| |  |  |  | | --- | --- | --- | | **ELABORÓ**  ***(Personas que elaboraron la guía)*** | **REVISÓ**  ***(Director de Programa o Área)*** | **APROBÓ**  ***(Laboratorios)*** | | Firma  Nombre : Jorge Andres Alvarez Triana  Fecha: 06/12/2016 | Firma  Nombre : Diana Paola Ovies Bernal  Fecha: | Firma  Nombre :  Fecha: | | |
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| **INFORME DE LABORATORIO**  (*Para elaborar por el Estudiante)* | |
| ESTUDIANTES: | **GRUPO:** |
| **NOTA:** |
| CARRERA: | |
| **Develop three objectives from your knowledge to perform the practice** | |
| **Develop a conceptual map of the subject matter in the lab.** | |
| **RESULTS**  Please include all the images obtained with their respect matlab code and the flow chart. | |
| **QUESTIONARY**   1. Justify the algorithm used to rotate the matrix image. 2. Justify the algorithm to apply bitslicing. 3. Justify the algorithm to reduce the spatial resolution. | |
| **PRINCIPAL SOURCES OF ERROR AND HOW TO IMPROVE THE CODE:** | |
| **CONCLUSIONS** | |
| **EXAMPLES OF PROFESSIONAL APPLICATIONS OF THE SUBJECT THEMES USED IN THIS GUIDE:** | |
| **BIBLIOGRAPHY USED:** | |