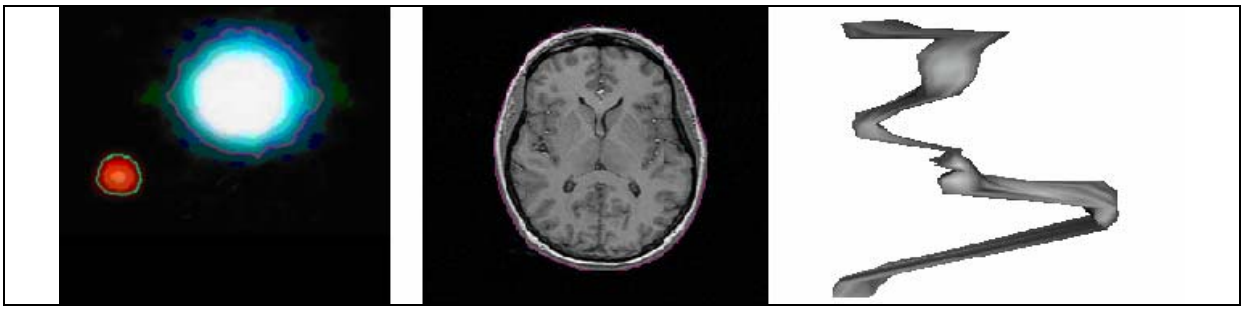
CSCI 597 cross-listed with CSCI 497

Image Processing With Applications

Spring 2006, T 7:20-10 PM

Instructor: Dr. Nikolay Metodiev Sirakov



Astronomical **Medical** **3D Geological Images**

OBJECTIVES: ***To introduce:***

1) **Areas of applications such as Medicine, Satellite Imaging, Internet, Geology and GIS;**
2) **Different modalities such as Gamma-Ray, X-Ray, Microwaves, Radio, Visible and Infrared.**

To develop the theoretical foundation of:

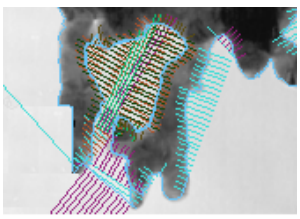
1. **Image enhancement in the spatial and frequency domains: Histograms, Arithmetic and Logic operations, Smoothing, Statistical, Gaussian Filters; Fourier Transforms; Gradient and Laplacian.**
2. **Image Restoration: Noise Models, Noise Reduction, Estimating the Degradation Function, Geometric Mean Filter and Transformations.**
3. **Color Image Processing; Color Models, Color Transformation, Sharpening and Segmentation.**
4. **Depends on time permission, an introduction to wavelets.**

To develop and/or enlarge the students':

1. **Theoretical background in the field;**
2. **Practical skills in working and manipulating images that comes from above listed fields of application;**
3. **Skills in developing algorithms and code the corresponding tool on the base of the theoretical concepts.**

As an additional activity (out of the course) for the interested students an introduction may be given to the most recent Image Analysis methods and algorithms. The top students could be considered for research projects involvement.

Prerequisites: CSCI 151,152; *Knowledge from Math 191, 192 is in help*



Nano-wire image segmentation

Projects Developed Spring 2005 Image Processing with Applications

Advisor: Dr. Nikolay Metodiev Sirakov

- **Image Enhancement in the Spatial Domain Using Power and Logarithmic Functions,** *Nathaniel Rowland* – Software, survey, *Jarrod Robinson* – survey, theory;


Result obtained by their C++ tool

- **Laplacian Filter: Edge Detection in Two Dimensions**, *Rohit Baxi* – survey, software, *Shannon Kratzmeyer*- survey, theory;


Result obtained by their C++ tool

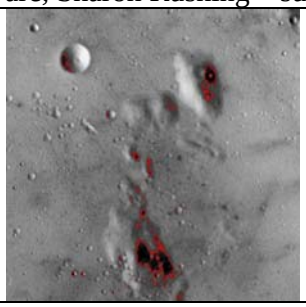
- **Using the Gradient in Image Processing,** *Charles Buhrmann* – survey software, *Jeremy Gaime*- survey, theory, *Jane Smith*-survey, theory;


Result obtained by their C++ tool

- **Image Enhancement with Histogram Equalization,** Smitha Palava – software, theory, Alla Pallavi Reddi- software and theory;

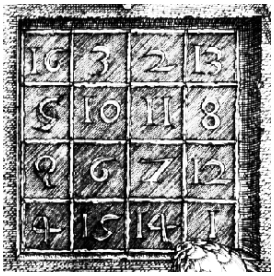

Result obtained by their C++ tool

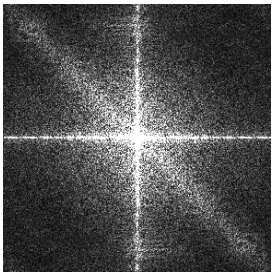
- **Image Enhancement Utilizing Histogram Matching,** Nilkantha Aryal – software, Sharon Rushing – survey, theory;



Result obtained by their C++ tool

- **The 2D Fourier Transform and its Application to Image Enhancement,** Jody Sheppard-survey and theory, Chad Robinson-theory and Mathematica notebook.





Result obtained by their Mathematica notebook.