



# Liver Segmentation and Classification

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Proper segmentation of soft tissues in medical images is necessary for a variety of medical tasks; for example doctors need to know an organ's volume and location before performing a transplant operation. Proper segmentation is also an important early step to developing a CAD (Computer Aided Diagnosis) program. Organs share similar intensity values and are located in close proximity to each other, fooling many segmentation algorithms. Texture solves these problems because while organs have similar intensity values, their texture is often unique.

Texture measures changes in intensity levels. It quantifies the smoothness of organs and the repeatability of any intensity patterns.

## Goals:

- To create a single segmentation filter for each organ and to then combine these filters.
- To determine if 3D texture algorithms collect more information than 2D texture algorithms.
- To develop a probabilistic algorithm to classify organs.
- Our long term goal is to accurately classify and completely segment a liver in an unsupervised environment; for example: able to load the CT scans, hit 'Run', and walk away.

## System Characteristics:

- Accurate
- Unsupervised
- Probabilistic-based



Figure 1:

Red = Manual segmentation

Blue = Segmentation performed by the program.

## Applications:

While we are currently performing our tests on liver scans our work is applicable to all soft tissue.

As stated earlier, texture based segmentation can be used in CAD systems, preparation for organ transplant, and even in non-medical situations such as satellite image analysis.

## Selected publications:

- R. Susomboon, D. Raicu, J. Furst, "An ANOVA-based Study for Liver Texture Invariance using Co-occurrence Matrices", SPIE Medical Imaging Conference, San Diego, CA, February 2008. (submitted)
- R. Susomboon, D.S. Raicu, and J.D. Furst, "A Hybrid Approach for Liver Segmentation", MICCAI'07 Grand Challenge, Brisbane, Australia, October 2007.
- M. Pham, R. Susomboon, T. Disney, D. Raicu, J. Furst, "A Comparison of Texture Models for Automatic Liver Segmentation", SPIE Medical Imaging Conference, San Diego, CA, February 2007.

## How you can contribute:

- We are always looking for people that want to learn about, or have experience with various texture, classification, or segmentation techniques.

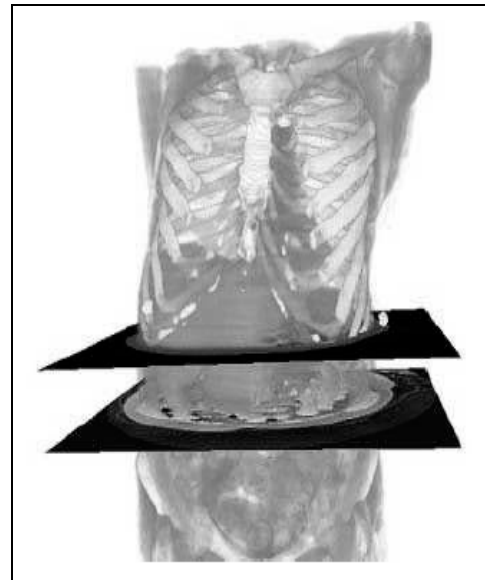


Figure 1: Illustration of CT slices with respect to the human body.

## To learn more about our lab visit

<http://facweb.cs.depaul.edu/research/vc>

e-mail our advisors,

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Or attend one of our visual computing seminars, held every other Friday, starting January 11th from 2:30-3:30 in room 610 (CTI)

## Acknowledgements:

This work was supported in part by the NSF through REU Grants and Northwestern University medical school.



We would like to thank UPE for organizing and sponsoring the Open Research Labs. e-mail them at [deltaupe@depaul.edu](mailto:deltaupe@depaul.edu) or visit them at [www.clinton.cs.depaul.edu/upe](http://www.clinton.cs.depaul.edu/upe)