

# Liver Tumor Segmentation Competition

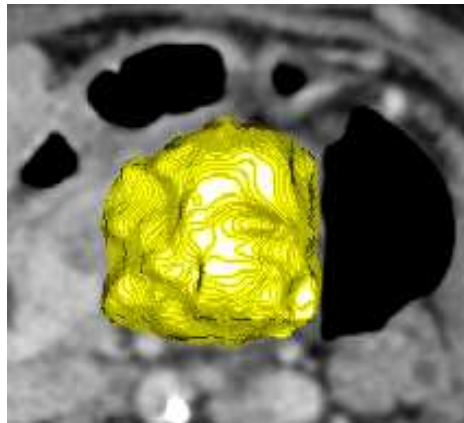
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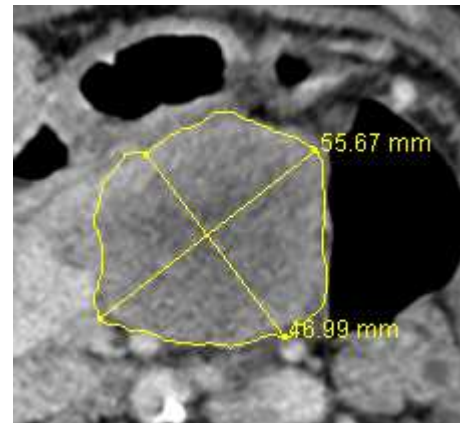
Sept. 6, 2008

## Introduction – Liver Tumor Segmentation (LTS) competition

- Liver cancer
  - One of the leading causes of death world-wide
  - Especially common in developing countries
- Tumor volume
  - Very important in cancer diagnosis and treatment response evaluation
  - More accurate assessment of tumor size than 1D/2D measurement



Volume



WHO (2D)

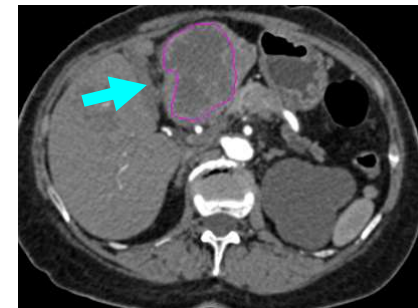
World Health Organization

## Introduction – LTS08 competition

- Evaluation of 3D tumor segmentation techniques
  - Essential for routine clinical use of tumor segmentation
    - Quantitative
    - Comprehensive
    - Large scale clinical datasets
  
- Goal of LTS08
  - Compare different liver tumor segmentation techniques
    - Under “real world” condition
  - Facilitate in-depth discussion and technical interchange

## Data

- CT imaging studies
  - Siemens SOMATOM Sensation CT scanner
    - One 64-slice and two 40-slice scanners
  - Standard contrast enhanced imaging protocol
    - Four-phase
    - Thin slice (1/1.5 mm)
    - In-plane resolution (0.6-0.9mm)
  - 30 tumors
    - Training: 10
    - Testing: 10
    - On-site contest: 10



## Evaluation Methods

- Reference segmentation
  - Manual segmentation
  - Confirmed by both participating radiologists
  
- Evaluation metrics
  - Overlap
  - Relative absolute volume difference
  - Average symmetric surface distance
  - RMS symmetric surface distance
  - Maximum symmetric surface distance
  
- Scoring system
  - Perfect segmentation – 100
  - Human observer – 90

# Results

|                       | pre-workshop | on-site | final |
|-----------------------|--------------|---------|-------|
| <b>Interactive</b>    |              |         |       |
| cmm                   | 73.4         | 66.5    | 70.0  |
| <b>Semi-Automatic</b> |              |         |       |
| Louvre                | 68.9         | 69.9    | 69.4  |
| MeVis                 | 71.5         | 66.6    | 69.1  |
| NUS-I2R-team1         | 63.9         | 65.0    | 64.5  |
| NUS-I2R-team2         | 72.4         | 66.4    | 69.4  |
| NUS-I2R-team3         | 56.0         | 58.2    | 57.1  |
| <b>Automatic</b>      |              |         |       |
| Definiens             | 47.5         | 72.2    | 59.9  |
| goma                  | 38.2         | 30.0    | 34.1  |
| LC Taker              | 65.4         | 67.6    | 66.5  |
| TKKBecs               | 48.4         | 45.2    | 46.8  |

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