Lung Tumor Segmentation for Whole Body PET Volume

Cherry Ballangan

Supervisors: David Feng & Xiuying Wang

School of Information Technologies

FACULTY OF ENGINEERING & INFORMATION TECHNOLOGIES

THE UNIVERSITY OF SYDNEY

AIMS

- To improve boundary definition of tumor delineation from whole body PET volumes.
- To solve the challenging problem of leakage into neighbouring hotspots.

METHODS

- Step1: Thoracic slices extraction based on K-means clustering.
- Step 2: Hotspots segmentation using Downhill Region Growing (DRG).
- Step 3: Hotspots classification based on decision tree.

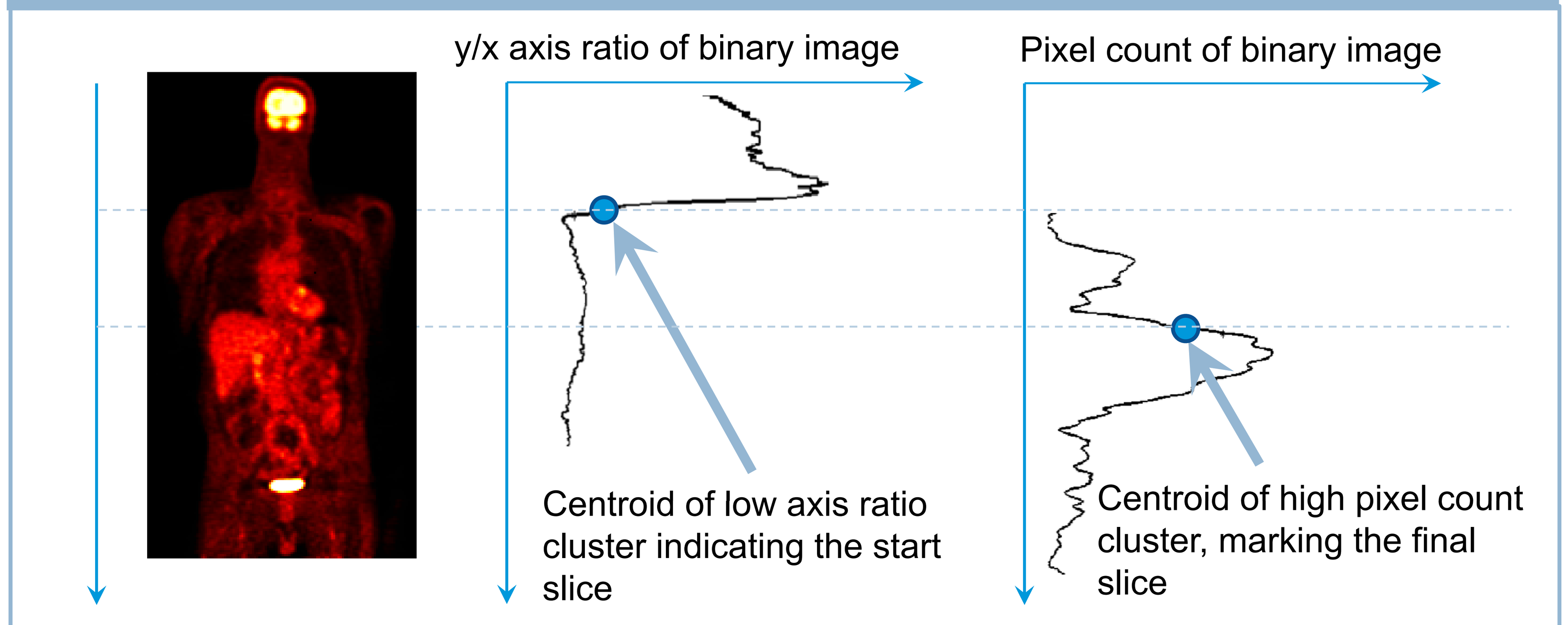
RESULTS

- Good and consistent thorax extraction results achieved for all 14 patients despite marked differences in size and shape of the lungs and the presence of large tumors in some patients.
- DRG is able to separate multiple hotspots in close proximity and improve boundary definition. 1210 hotspots detected, includes all tumors present in 13 patients.
- DRG achieved an average volume overlapped fraction (VOF) of 0.607 ± 0.126 which outperformed 4 other approaches.
- The connectivity ratio which benefitted from DRG can reduce the number of hotspots from 1210 to 90. Other criteria further reduce the hotspots to 30.

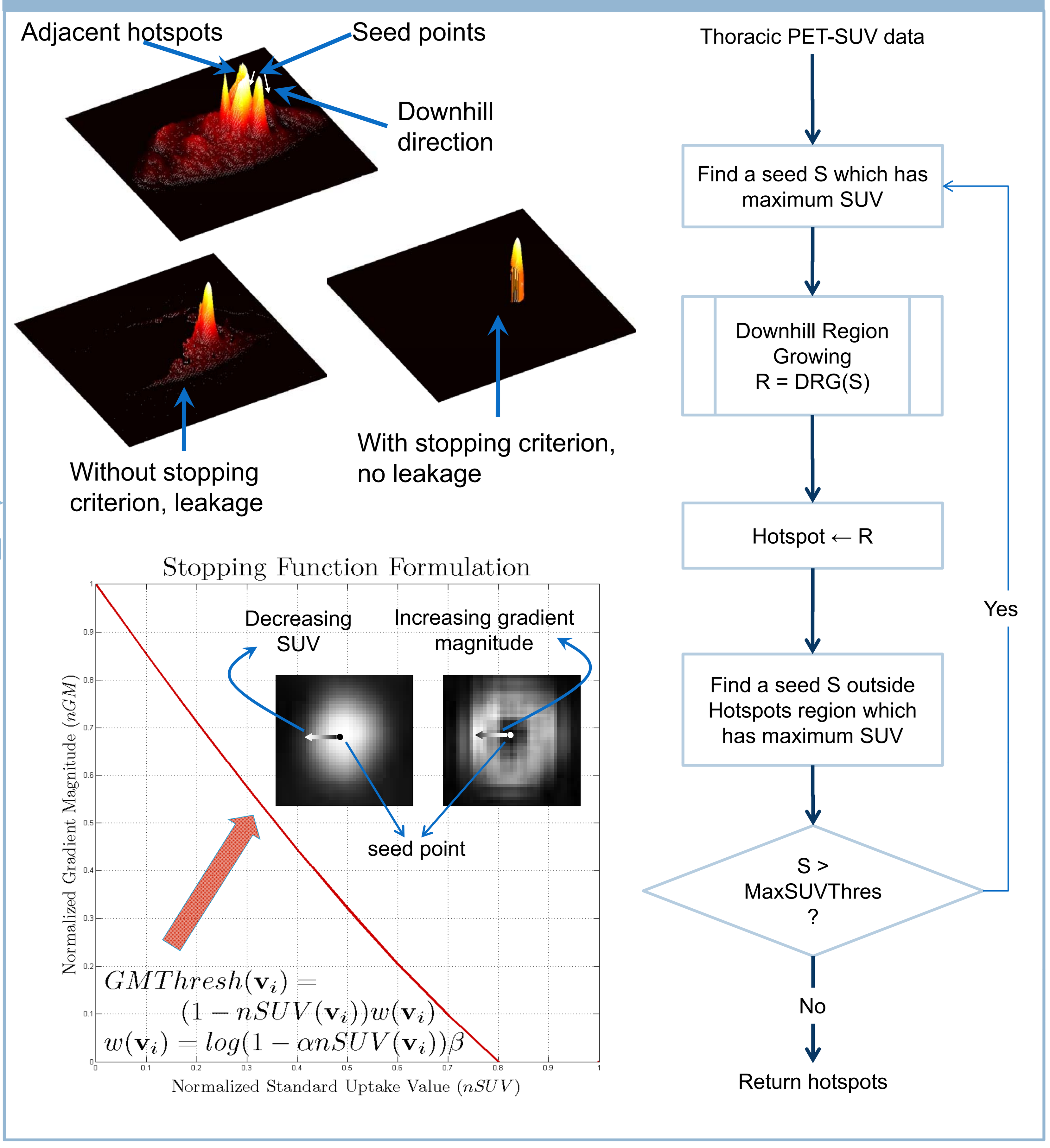
REFERENCE

- C. Ballangan, X. Wang, S. Eberl, M. Fulham, and D. Feng, Automated Lung Tumor Segmentation for Whole Body PET Volume Based on Novel Downhill Region Growing, Proc. SPIE Medical Imaging 7623, 76233O (2010).

Methods, Step 1: Thoracic slices extraction based on K-means clustering

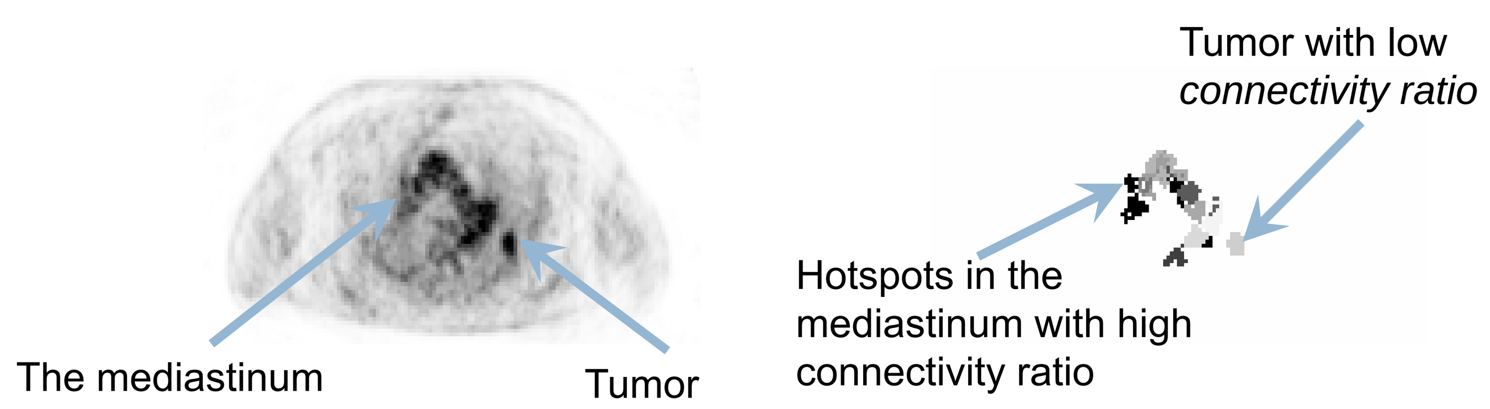


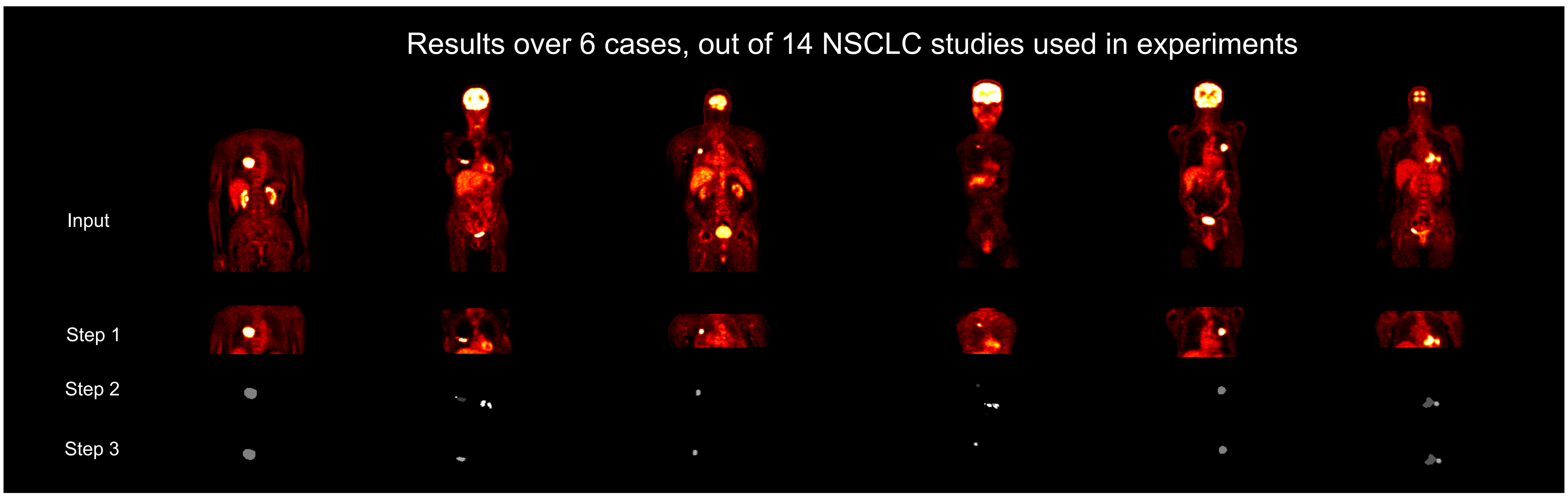
Methods, Step 2: Hotspots segmentation based on DRG



Methods, Step 3: Hotspots classification based on decision tree

•Main criterion: *connectivity ratio* (benefitted from DRG)
•Other criteria: size, z coordinate location and distance from middle x-coordinate.





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