

3D-CNN for False Positive Reduction of Lung cancer nodule

Nanyang Technological University

Johan Kok Zhi Kang

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I am a student from Nanyang Technological University, Singapore and am working an automatic nodule detection system for lung cancer patients, as part of my project.

My submission uses 3D-CNN data provided by the Luna training set, along with ground truth labels from the candidates_V2.csv file. Positive nodules were up-sampled up to 4 times the original dataset using rotation angles $\theta \in \{0, 90^\circ, 180^\circ, 270^\circ\}$. This sample was mixed with the negative cases, which were down-sampled to make the ratio of P:N = 1:X. Here, we chose X to range from 1 - 20 and trained our model on these ratios. The best performing model was selected based on validation set results.

My model works on a 32 x 32 x 32 patch of lung volume trained on a network consisting of 24 layers. I apologize as I am unable to reveal the exact details of the network since it is in the process of refinement. However, initial runs on the model showed substantially good performance on the test sets prepared. I would thus like to evaluate it's performance via the competition to understand its strengths and weaknesses better.

As an improvement for the system, we could consider increasing the positive nodule pool so that the network will be more sensitive to variations of nodule sizes. We could also consider incorporating boosting to improve network performance on the limited dataset size we have.