DFD-Net: lung cancer detection from denoised CT scan image using deep learning

Worku J. SORI, Jiang FENG, Arero W. GODANA, Shaohui LIU, Demissie J. GELMECHA

Frontiers of Computer Science, DOI: 10.1007/s11704-020-9050-z

Problems & Ideas

- Problems of Lung Cancer Detection using deep learning
  - The intricacy information that nodules are made of
  - The innate morphology of nodules
  - The predominance of noise
- Ideas: A two path deep learning model (**DFD-Net**) that denoising CT scan image first.
  - two-path convolutional network is employed to characterize and learn different morphology of nodule features and contextual information.
  - discriminant correlation analysis select more representative features in the two path model.

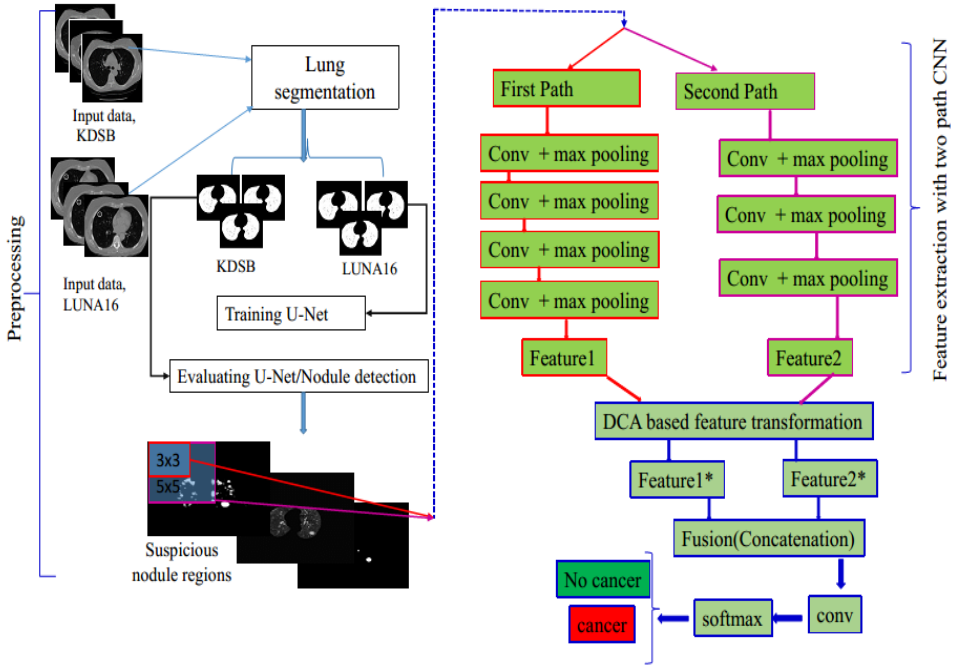

Fig 1: DFD-Net framework.

Main Contributions

Methods	R	S	A
DFD-Net^S	0.874	0.891	0.878
DFD-tp^S	0.865	0.891	0.871
DFD-f^S	0.855	0.851	0.854
DFD-s^S	0.83	0.821	0.828
DFD-Net	0.789	0.782	0.788
DFD-tp	0.768	0.762	0.766
DFD-f	0.673	0.683	0.676

Table 1: DFD-Net model and its variation performance (superscript s represent re-training result of the model)

Approaches	No. S	no. cp	%cp	no. wp	%wp
DFD-Net^S	Bigger(150)	145	96.66	5	3.33
	Smaller(150)	143	95.33	7	4.66
DFD-tp^S	Bigger(150)	144	96	6	4
	Smaller(150)	143	95.33	7	4.66

Table 2: Morphological context performance, where No. S: number of samples, no.cp: number of correctly predicted, no. wp: number of wrongly predicted, %cp: percentage of correctly predicted, and %wp: percentage of wrongly predicted.