

SAMA: Spatially-Aware Multimodal Network with Attention for Early Lung Cancer Diagnosis

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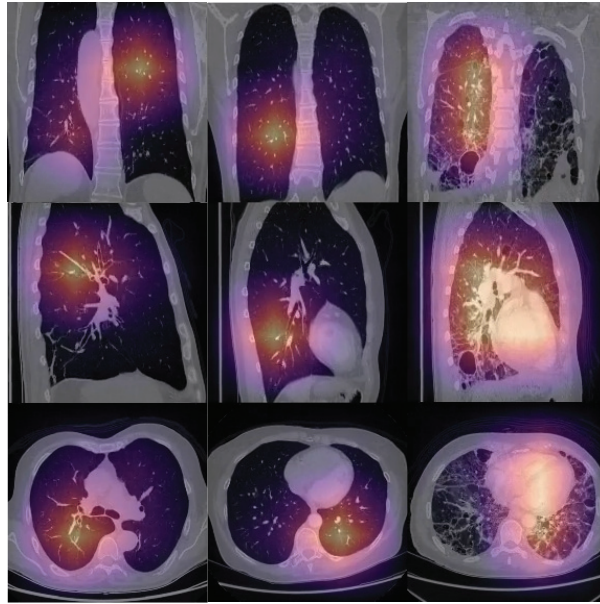


Fig. 1. Qualitative results of the dynamic filter response map Results for seven different patients shown in columns. Coronal, Sagittal and Axial planes in the rows. SAMA focuses attention where radiologists identified pathologies. From left to right: *i*) Patient with a nodule in the left superior lobe. *ii*) Patient with a nodule in the right inferior lobe *iii*) Patient with tree-in-bud. For patients with cancer, SAMA spatial attention with dynamic filters focuses on the nodules' specific location. Still, for patients with other pathologies, SAMA identifies their location. SAMA's spatial attention resembles radiologists' diagnostic process by focusing on specific locations where they identify pathologies' visual characteristics.

Table 1. Comparison with the state-of-the-art method LUnG CAncer Screening with Multimodal Biomarkers Dataset (LUCAS) [3] of our model without the spatial representation S , our model without Dynamic Filters, and our final method SAMA. Experiments performed with 5-fold cross-validation. Results for F1 and AP metrics for each fold and the average for each metric, standard deviation in parenthesis.

Model	Fold	F1	AP	$F1_{avg}$	AP_{avg}
LUCAS [3]	1	0.158	0.068	0.198 (0.042)	0.091 (0.019)
	2	0.182	0.093		
	3	0.166	0.075		
	4	0.228	0.110		
	5	0.256	0.108		
SAMA No S	1	0.262	0.192	0.287 (0.053)	0.22 (0.072)
	2	0.256	0.145		
	3	0.273	0.216		
	4	0.261	0.209		
	5	0.381	0.339		
SAMA No Dynamic Filters	1	0.227	0.152	0.256 (0.06)	0.167 (0.079)
	2	0.276	0.145		
	3	0.333	0.206		
	4	0.263	0.133		
	5	0.316	0.306		
SAMA	1	0.286	0.200	0.341 (0.058)	0.251 (0.061)
	2	0.286	0.187		
	3	0.414	0.303		
	4	0.333	0.324		
	5	0.385	0.240		