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Diagnosing Pulmonary Embolism by Integrating Patient-level Diagnosis and Embolus-level Detection

Inventors

Jianming Liang

Contact

Jovan Heusser
jovan.heusser@skysonginnovations.com

Pulmonary Embolism (PE) is a common cardiovascular emergency with nearly 600,000 cases annually, 200,000 of which result in death. It is important to quickly and correctly diagnose PE since the majority of PE related deaths occur within the first few hours. Unfortunately, PE is among the most difficult conditions to diagnose, in part because the symptoms may present as any number of other conditions. CT pulmonary angiography (CTPA) is the diagnostic standard for suspected PE; however interpretation of the images is time consuming and requires highly specialized knowledge. Thus there is a critical need to mitigate rapidly increasing radiologist workload and improve the efficiency and accuracy of PE diagnosis in CTPA.

Prof. Jianming Liang from Arizona State University has developed an innovative computer aided diagnosis system for PE detection. By using advanced algorithms and classifiers for patient-level diagnosis with embolus-level detection, non-PE patients can be excluded without overlooking PE patients. This positively impacts the system performance because the rate of true positive CTPA is only 5-10% and the treatment for PE is usually systemic, therefore false positives (FPs) impose extra burdens on the radiologist to evaluate and reject FPs in nearly all negative patients.

This technology effectively establishes a unified framework to achieve both patient-level diagnosis and embolus-level detection with a drastic reduction in false positives and workload for radiologists.

Potential Applications

- Accurate diagnosis of PE in CTPA images

Benefits and Advantages

- Reduced false positives
- Correct distinction of PE and non-PE patients
- High Sensitivity
- System may generate multiple candidates for the same embolus, and as long as one candidate is identified the entire embolus can be easily traced out - this helps further eliminate false positives without hurting detection sensitivity

For more information about the inventor(s) and their research, please see [Dr. Liang's departmental webpage](#)

