

Computer-Assisted Decision Support System in Pulmonary Cancer detection and stage classification on CT images

Full Reference

[Masood et al 2018] Masood, A., Sheng, B., Li, P., Hou, X., Wei, X., Qin, J., Feng, D. (2018): Computer-Assisted Decision Support System in Pulmonary Cancer detection and stage classification on CT images. *Journal of Biomedical Informatics*, 79: 117-128

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Content of paper summarized

- **Problem:** Lung cancer often leads to death, especially when not detected in early stages
- **Goal & Scope:** The IDSS should detect if the patient has lung cancer using CT images. In addition, it should classify the pulmonary nodules into four stages of cancer. Data from sensors that track e. g. the humans heart rate help classify the cancer. The radiologist in charge should receive the classification results
- **Data Sources:** Sources from „The Cancer Imaging Archive“ (TCIA) and LISS Database for training. SPIE Challenge Dataset for testing.

Architecture

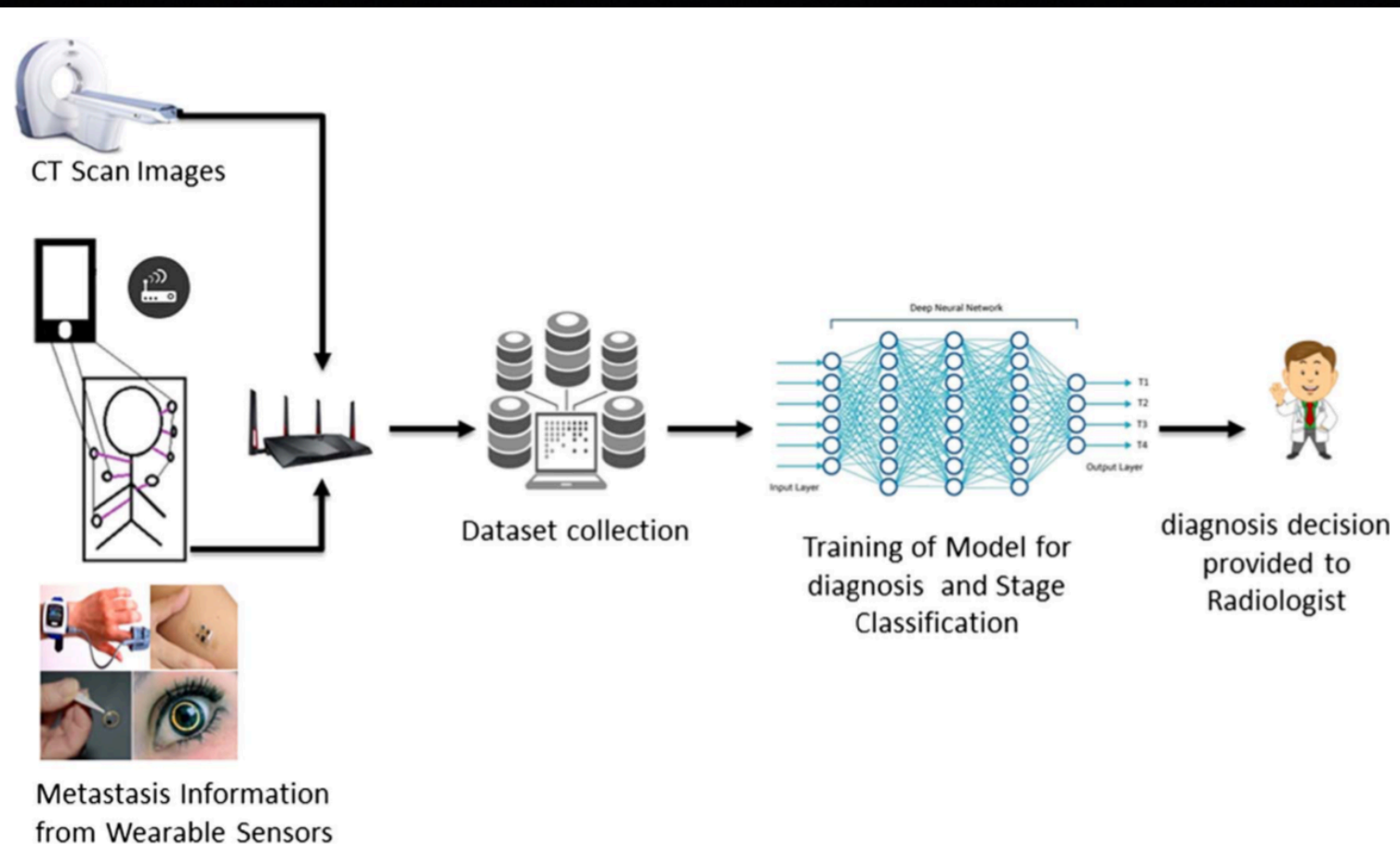
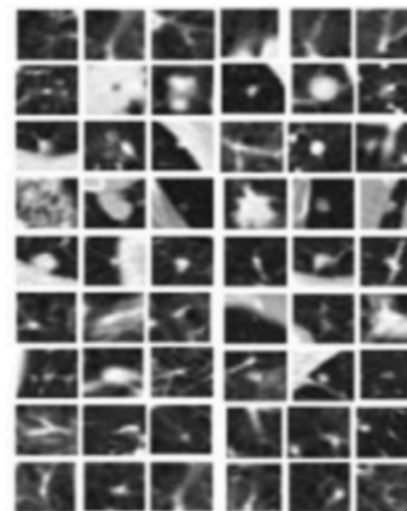


IMAGE PRE-PROCESSING



ROI BASED SEGMENTATION



CLASSIFICATION USING



Nodule Class:
Malignant or
Benign

Non-Nodule
Class

Intelligent methods used

- Thresholding for preprocessing the images (Region of Interest filtered)
- Deep Fully Convolutional Neural Network for classification and segmentation
 - Optimization done via Stochastic Gradient Descent

Evaluation methods used

- Multiple Evaluation methods used:
 - Dice Coefficient, Confusion Matrix, Recall, Precision, Accuracy, F1-Score, Comparison to the State of the Art CNN TumorNet
- Comparison to TumorNet using Accuracy, Precision and Recall. Performed slightly worse when not using sensor data, performed way better than it on their own dataset with sensor data. Conclusion: Classifying not using only images but also sensor data improves the results