Deep learning for cancer risk stratification in asbestos-exposed subjects

Training period/Location:

4-6 months in 2023 (April-September), LaBRI, UMR 5800, University of Bordeaux

Subject:

Several studies have evaluated professional exposure to asbestos as a risk factor for the occurrence of cancer (1). The chest CT scan is the cornerstone of pathology screening benign or malignant related to asbestos exposure (2). With the advent of deep learning, the interest of developing cancer predictive models based on these methods has become increasingly popular (3).

In this project, we hypothesize that chest CT images made in the context of the follow-up of subjects professionally exposed to asbestos, contain information that can be analyzed by deep learning models, combined with clinical data and exposure data, thus making it possible to predict the occurrence of a cancer not only thoracic but also extra thoracic. The candidates will focus on the segmentation of the pleural plaque and interstitial involvement based on Convolutional Neural Networks (CNN) and on the prediction of cancer occurrence based on the obtained segmented chest scan. To this end, She/He will integrate clinical and exposure data into the prediction model to improve cancer diagnostic scores.

Objectives of the project:

- To propose a review of current Deep Learning (DL) methods applied to the diagnostic of cancer using chest scans.
- To develop a DL model to segment the pleural plaque and interstitial involvement.
- To develop a DL model to predict the cancer occurrence based on the segmented chest scan.
- To propose improvements of the studied DL model using clinical and exposure data.
- To validate the proposed method on provided datasets.

Candidate:

The candidate (diploma of engineering school or Master 2) should be a specialist in deep learning and machine learning. She/He will have skills in image processing and programming. Interest in medical imaging is a plus. A good experience of Python, Keras, Pytorch and tensorflow is recommended. A good English reading/writing is also a key element.

Application:

To apply, send a file containing CV, list of publications (if possible), motivation letter, transcripts of diploma, defense report (if possible) as well as any documents likely to strengthen the application.

Supervisors:

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References: