Segmentation-based Classification model For lung cancer disease diagnosis

Team Members' Information:

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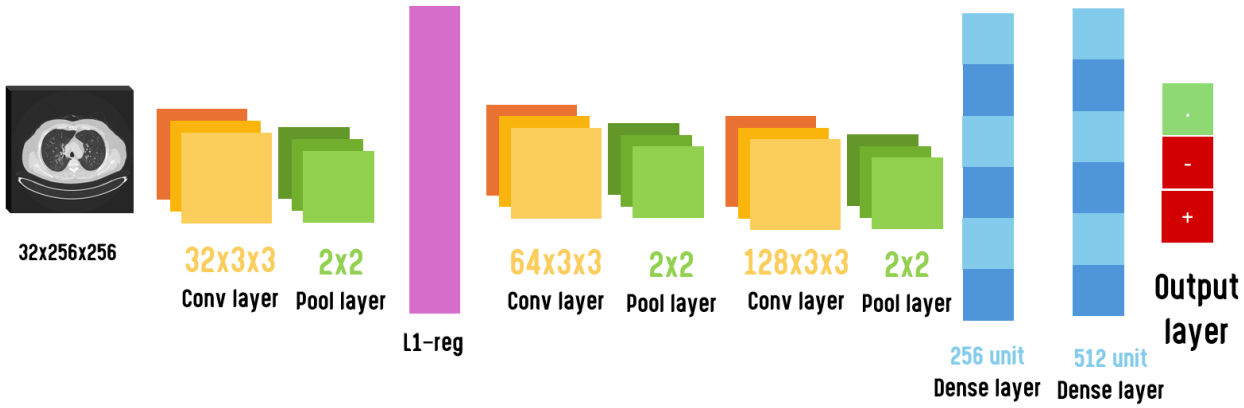
Objective: **in general**: lung cancer diagnosis. **specifically**, early detection for lung cancer

Experiments: *framing into two approach with a fixed preprocessing steps*

- **Data preprocessing** Normalization, image resizing ,Then split data it into train and test
- **Approach one:** Preprocessed data go to the custom CNN architecture to train.



Batch size	Loss function	Optimizer	Epochs
32	categorical cross entropy	Adam	10

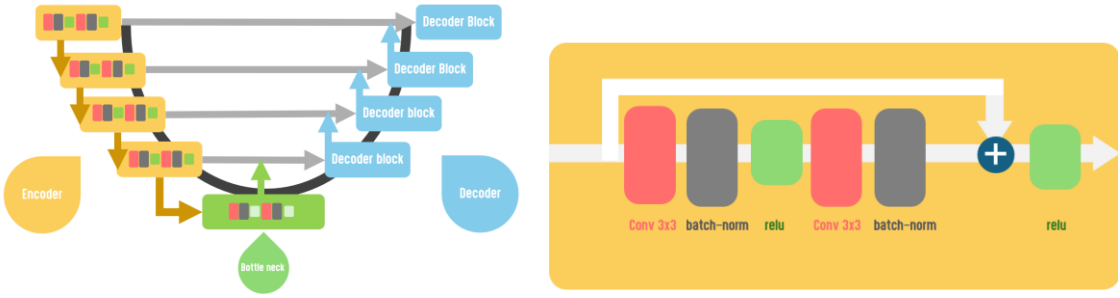
Performance in the first approach

Metric	Accuracy	Precision	Recall	F1-Score
Train (%)	99.432	100.00	99.430	99.437
Test (%)	98.74	100.00	98.26	98.36

- **Approach Two:**

  Second approach based on giving the model the internal part of the lung isolated. For lung isolation from the CT scan, we made segmentation model generate mask for lung.

  Segmentation model architecture:



architecture based on U-net & its encoder ResNet trained on CT scan data and lung masks

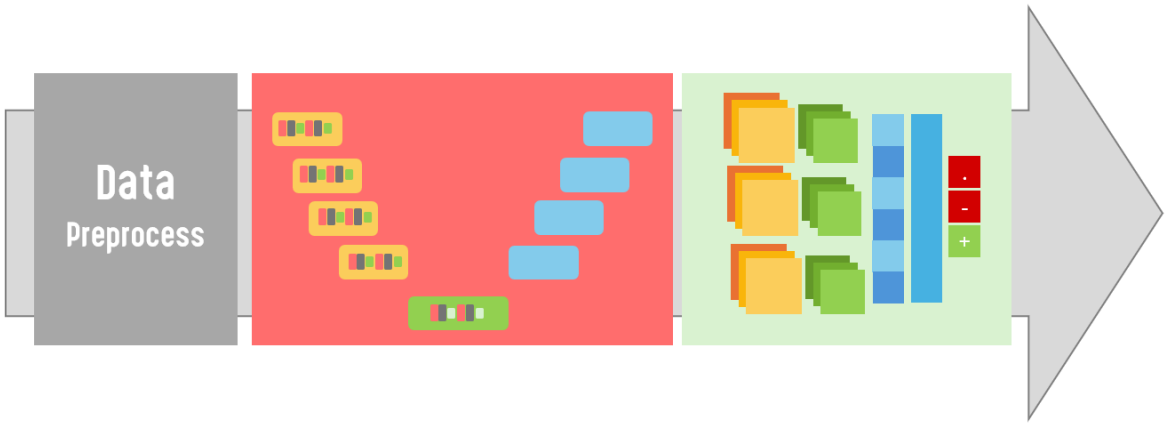
Batch size	Loss function	Optimizer	Epochs
32	Custom	Adam	100

Custom loss = class weights x categoric cross entropy + dice loss

(i.e.) there was unbalancing in background and lung part in masks so we calculate weights which will be multiplied in the classes for balancing

Before and after adding class weights to the loss function

metrics	IOU	F1-Score
before	0.8753%	0.9335%
after	0.9484%	0.9735%



Classification model architecture is the same but we trained it on CT scan masks applied to them to isolate the lung

Performance in the second approach

Metric	Accuracy	Precision	Recall	F1-Score
Train (%)	99.714	100.00	99.711	99.715
Test (%)	95.675	94.273	95.675	95.579