A 30 minute read summary on a paper on Liver Cirrhosis Detection

Notebook:	Machine learning		
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Ref: https://pubmed.ncbi.nlm.nih.gov/32232524/

Main Idea:

- Performance relies on -
    1. genetic Algorithm
    2. Singular value decomposition
    3. Particle swarm organizing
- Extract Liver Capsule
    1. Sliding Window detector
        1. AdaBoost - for selecting most discriminative feature
        2. 4 kinds of channels are created-
            1. original image
            2. gradient magnitude
            3. gradient histograms
            4. DOG(Difference of Gaussian)

            They are compared with conventional VI detection, result: generate a response map
    2. linking by dynamic programming
        1. purpose: extract a complete curve from the detection response(per-pixel classification happened)
- CNN for feature extraction
    1. Classification model: trained to classify each pitch triplet
    2. produce feature vector input for SVM
- SVM classifier for binary classification
    1. Deep classification model with transfer learning
    2. Evaluation
        1. 3-fold cross-validation scheme
        2. ROC-AUC values
        3. two low level features re listed:
            1. histogram of oriented gradients
            2. local binary pattern
        4. Impact of patch size
            1. patch size of 30-40 cm(plotting the 3-D curve and get the highest Laplac0ian value)
        5. Impact of Detection Error
            1. AUC value: 0.968
            2. performance of the detector 88%

Experiments:

1. Performance of the detector
2. Impact of detection error
3. CNN vs Hand Crafted Features
4. Impact of patch size

Cirrhosis diagnosis system focuses on -

1. quantitatively analyzing features
2. fractal
3. statistical texture
4. spectral
5. combined

Suggested Models

1. Random Forest
2. SVM
3. WPT (Wavelet packet transform)
4. M-band wavelet