Enhanced Nightshade-CNN

Algorithm Steps:

Input: Nightshade crop leaf Images with complex background.

Steps:

Phase I Partial Background Removal

Initialization:

1. Nightshade crop leaves such as tomato, potato, bell pepper, and eggplant leaves have been used from different agriculture sites [126-132].

Preprocessing:

1. For each instance of data
    a. Use **ImageDataGenerator** for augmentation
    b. **scikit-learn** for split the data in training, testing and validation.
    c. Identification of background and leaf using watershed and graph cut
        i. Background detection

            If (more green index (ExG=2G-R-B) and an more red index (ExR=1.4R-G-B)) => soil background

            If color == white (R>200,G>220, B>200) => background

            If color== black (R, G, B <30) => background

            If (color == highly detail) => texture background

            If (hole == 100 pixel)=> neglect

        ii. Leaf detection
            1. Greyscale morphology
            2. Solidity measurement
            3. Edge making
        iii. Vein detection
        iv. Protrusion detection
2. Cut out leaf region by Graph cut and watershed.

Phase II Disease Identification

Hyperparameter Selection:

3. Define the model parameters like batch size, learning rate, epochs, padding, stride, no of layers, activation functions, filters etc.

Model Creation:

4. Configure the model based on the set parameter in step 4.
5. Apply the activation function to the configured model

Compilation:

6. Compile the model using Adam optimizer with 0.0001 learning rate.

Training:

7. Train the model

Validation:

8. Validate the model.

Testing:

9. Test the model for the unseen data and check the accuracy of the model.
10. Disease identification