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Plant recognition, detection, and counting with deep learning

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Propositions accompanying the thesis

1. Deep learning exhibits better performance than the bag of words based techniques on the plant datasets. (Chapters 1 and 2, this thesis)

2. Applying the appropriate choices of data augmentation techniques (rotation, illuminations, contrasts, and projective transformation) to the training set significantly improves the recognition performance of deep networks, on the other hand, applying some techniques (blur) may not be promising. (Chapters 2, 3 and 5, this thesis)

3. One significant obstacle for highly accurate plant recognition is the marginal difference of the visual appearance (fruits and leaves) among different plant species. (Chapters 2 and 5, this thesis)

4. Data augmentation by adding more objects to images can be of great help for the regression-based counting approach. (Chapter 4, this thesis)

5. Deep neural networks combined with the One-vs-One classification scheme can be beneficial for training on small datasets. (Chapter 5, this thesis)

6. Training neural networks with the One-vs-One classification scheme is more stable than training with the One-vs-All classification and can be advantageous for a domain with little data. (Chapter 5, this thesis)

7. In deep learning, we may frequently stand on the shoulders of giants.

8. “Some people can not believe in themselves until someone else believes in them first.” — Robin Williams as Sean Maguire, Good Will Hunting