TSB-funded Project 'TADD'- Trainable vision-based anomaly detection and diagnosis Technical Report for September 2014

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Chapter 1

Introduction

This is the September 2014 report for the project TADD. The core topic of this report is software development for QA-TADD. The job description for this month is taken from the objectives of QA-TADD for Q7 which is implementing additional features to distinguish class types that are misclassified frequently.

Chapter 2

QA-TADD Development

In the last month (August 2014), we implemented LBP and Gabor filte C++ codes separately from QA-TADD. These codes were able to extrac the features and save the results in to the hard disk. In this month, these features have been integrated into QA-TADD projects: cSLIC, TADDengine and Qt-TADD. First and higher orders statistics of filtered images (LBP or Gabor) have been used in QA-TADD. Afterwards, we have done some experiments to see the effects of these new features in distinguishing some blemish types when they were hard to classify. Figures 2.1 to 2.5 are some examples comparing the QA-TADD with basic features and basic features+LBP+Gabor. We used 41 images of red potatoes to test QA-TADD which was trained with a saved classifier consisting of 8 images. Superpixel selection for this saved classifier was interactvie and it was reported in the last quarterly report.

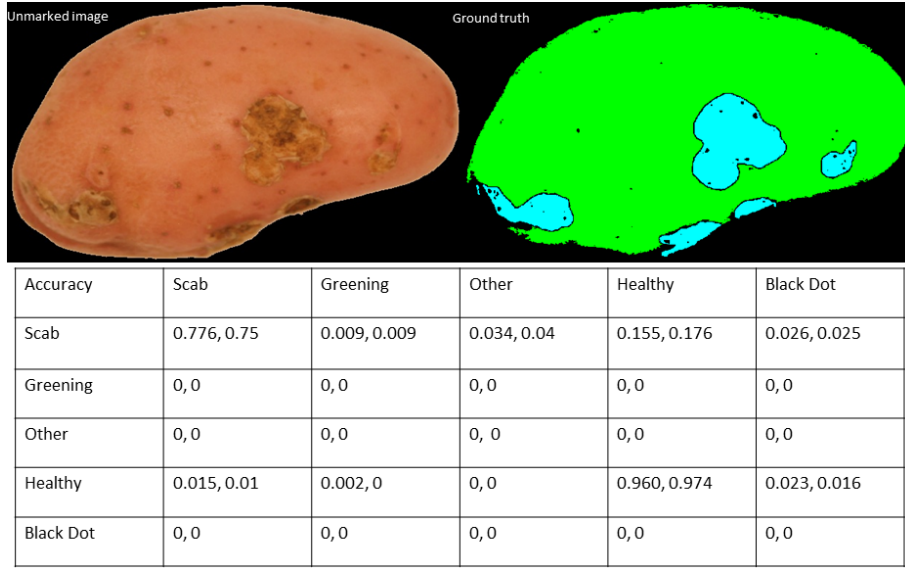| Accuracy	Scab	Greening	Other	Healthy	Black Dot
Scab	0.776, 0.75	0.009, 0.009	0.034, 0.04	0.155, 0.176	0.026, 0.025
Greening	0, 0	0, 0	0, 0	0, 0	0, 0
Other	0, 0	0, 0	0, 0	0, 0	0, 0
Healthy	0.015, 0.01	0.002, 0	0, 0	0.960, 0.974	0.023, 0.016
Black Dot	0, 0	0, 0	0, 0	0, 0	0, 0

Figure 2.1: Example 1 of QA-TADD result with basic features and with added features. Left image is the unmakred image and right image is the ground truth image. Left numbers are for the QA-TADD with basic features whilest the right numbers are from basic features plus two additional features.

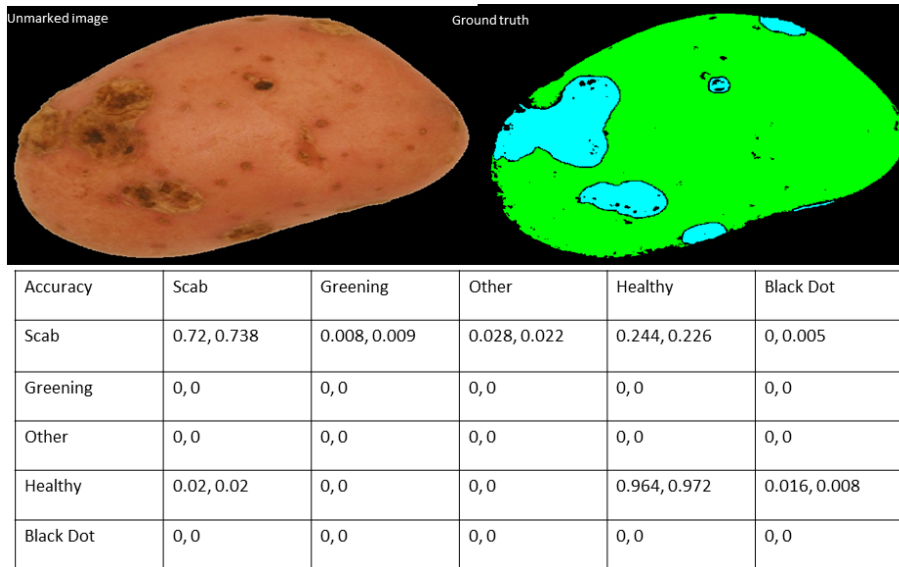| Accuracy	Scab	Greening	Other	Healthy	Black Dot
Scab	0.72, 0.738	0.008, 0.009	0.028, 0.022	0.244, 0.226	0, 0.005
Greening	0, 0	0, 0	0, 0	0, 0	0, 0
Other	0, 0	0, 0	0, 0	0, 0	0, 0
Healthy	0.02, 0.02	0, 0	0, 0	0.964, 0.972	0.016, 0.008
Black Dot	0, 0	0, 0	0, 0	0, 0	0, 0

Figure 2.2: Example 2 of QA-TADD result with basic features and with added features. Left image is the unmakred image and right image is the ground truth image. Left numbers are for the QA-TADD with basic features whilest the right numbers are from basic features plus two additional features.

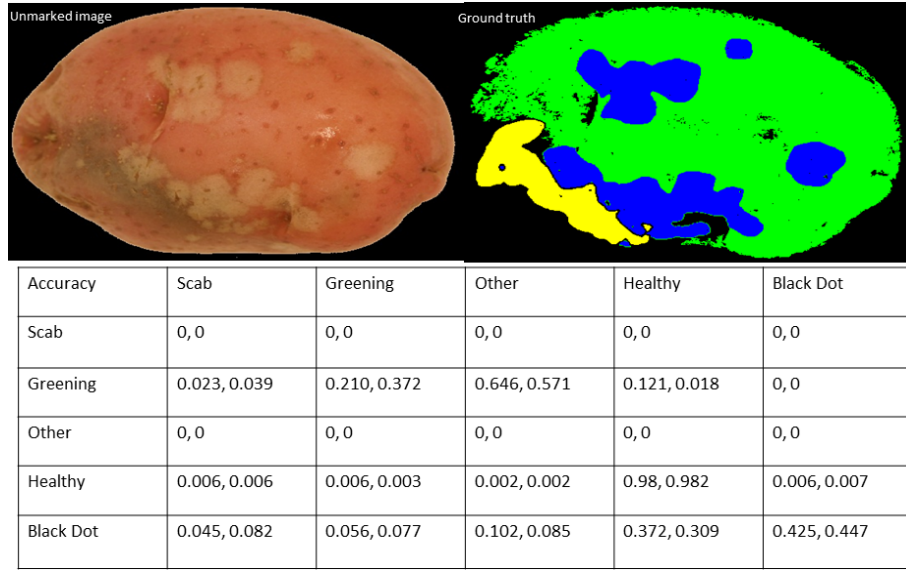| Accuracy	Scab	Greening	Other	Healthy	Black Dot
Scab	0, 0	0, 0	0, 0	0, 0	0, 0
Greening	0.023, 0.039	0.210, 0.372	0.646, 0.571	0.121, 0.018	0, 0
Other	0, 0	0, 0	0, 0	0, 0	0, 0
Healthy	0.006, 0.006	0.006, 0.003	0.002, 0.002	0.98, 0.982	0.006, 0.007
Black Dot	0.045, 0.082	0.056, 0.077	0.102, 0.085	0.372, 0.309	0.425, 0.447

Figure 2.3: Example 3 of QA-TADD result with basic features and with added features. Left image is the unmakred image and right image is the ground truth image. Left numbers are for the QA-TADD with basic features whilest the right numbers are from basic features plus two additional features.
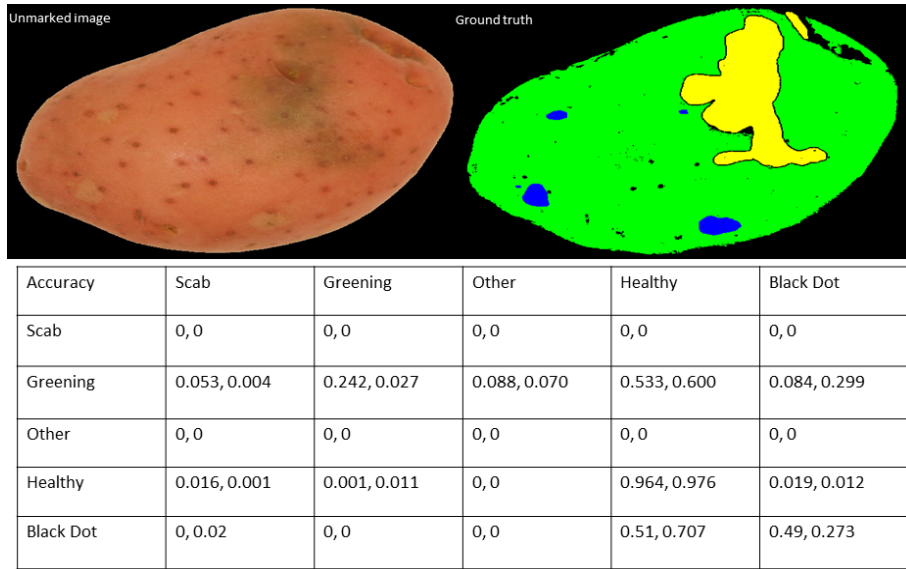

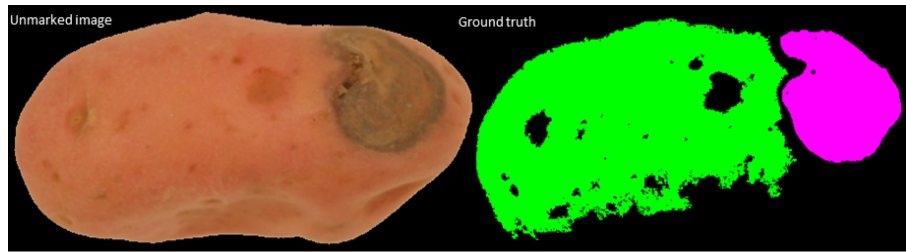| Accuracy	Scab	Greening	Other	Healthy	Black Dot
Scab	0, 0	0, 0	0, 0	0, 0	0, 0
Greening	0.053, 0.004	0.242, 0.027	0.088, 0.070	0.533, 0.600	0.084, 0.299
Other	0, 0	0, 0	0, 0	0, 0	0, 0
Healthy	0.016, 0.001	0.001, 0.011	0, 0	0.964, 0.976	0.019, 0.012
Black Dot	0, 0.02	0, 0	0, 0	0.51, 0.707	0.49, 0.273

Figure 2.4: Example 4 of QA-TADD result with basic features and with added features. Left image is the unmakred image and right image is the ground truth image. Left numbers are for the QA-TADD with basic features whilest the right numbers are from basic features plus two additional features.

Accuracy	Scab	Greening	Other	Healthy	Black Dot
Scab	0, 0	0, 0	0, 0	0, 0	0, 0
Greening	0, 0	0, 0	0, 0	0, 0	0, 0
Other	0.047, 0.042	0.068, 0.101	0.81, 0.82	0.075, 0.037	0, 0
Healthy	0, 0	0, 0.002	0, 0	0.998, 0.997	0.002, 0.001
Black Dot	0, 0	0, 0	0, 0	0, 0	0, 0

Figure 2.5: Example 5 of QA-TADD result with basic features and with added features. Left image is the unmakred image and right image is the ground truth image. Left numbers are for the QA-TADD with basic features whilest the right numbers are from basic features plus two additional features.

Chapter 3

Conclusions

In this September 2014 report, we have integrated two features (LBP and Gabor filter) into QA-TADD and we initialised their paramteres based on several experiments. They have been added to Cslic, QtTADD and TAD-Dengine parts of QA-TADD. Afterwards, we compared results of blemish type classification with these additional features with QA-TADD using just the basic features.