



The Computerworld Honors Program

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Final Copy of Case Study

Status:

Laureate

Year:

2013

Organization Name:

Cognizant Technology Solutions

Organization URL:

www.cognizant.com

Project Name:

Research & Development

Please select the category in which you are submitting your entry:

Innovation

Please provide an overview of the nominated project. Describe the problem it was intended to solve, the technology or approach used, how it was innovative and any technical or other challenges that had to be overcome for successful implementation and adoption. (In 300 words or less.)

Automatic detection of diseases from the image is an essential research topic as it may prove benefits in monitoring large fields of Crops (for Crop Diseases), and automatically detect the (human) skin diseases in a remote patient monitoring or remote healthcare scenarios. The image based diseases detection is expensive, inefficient and difficult, and also it requires the expertise for classification. Our project aims to detect the different types diseases of infected cotton leaves and also procedure towards identifying diseases at early-infected stage using image pattern recognition techniques. The digital image of the cotton leaves at different stages of the disease is collected from different plants and stored. The image analysis of the leaves is done using standard patterns of the digital images.

These patterns of various infected cotton leaves at different stages and healthy cotton leaves are collected, stored in the system and processed. To identify the diseased leaf, image pattern recognition artificial intelligent methods such as Neural Networks, adaptive Neural Networks and evolutionary Neural Networks were implemented (Refer Appendix 1). We believe that on-field robotic disinfectant machines in the near future can use our technology towards detecting the crop diseases and automatically spray right quantum of the appropriate disinfectant. We also implemented similar image pattern recognition approaches towards identifying/classifying various human skin cancer/diseases (Refer Appendix 2) in a remote healthcare environment. In the above said scenarios, accurate Classification leading towards precise and intelligent decisions is a complex problem - Hence non-functional requirements such as performance is a challenge. These challenges were successfully overcome by use of efficient coding and perfect training the neural network models. Implementation of similar automated and intelligent techniques in agriculture, healthcare scenarios is a first of its kind and could catalyze productivity in general and in emerging markets/economies in specific.

When was this project implemented or last updated? (Please specify month and year.) Has it incorporated new technologies and/or other innovations since its initial deployment? (In 300 words or less.)

The work towards detection of crop diseases was finished in September 2012 and work relating to dermatology (human skin diseases) was finished in November 2012. Few pilots were deployed. Initially classification tasks were performed done with help of a back propagation neural network and the results were found to produce considerable false positives. Hence a new neural network models which could be adaptive was tried and it certainly helped in improving the results obtained through the earlier methods.

If this is a previously submitted project that has been significantly updated and/or expanded, please describe the nature of the update here. (In 300 words or less.)

Not Applicable.

Is implementation of the project complete? If no, please describe the project's phases and which phase the project is now in. (In 300 words or less.)

Successful Lab implementations for both Crop Diseases as well as Dermatology (Human skin Diseases) diseases were done. Plans are in pipeline towards real-time/on-field implementations.



Please provide at least one example of how the technology project has benefited a specific individual or organization. Feel free to include personal quotes from individuals who have directly benefited from the work. (In 300 words or less.)

Crop disease implementation was demonstrated to internal Business Units and found to be highly successful and useful. Automated Crop Disease monitoring, classification leading towards an intelligent spray of right quantum of appropriate disinfectant could be a major boon for Agriculture sector. On the other hand implementation of intelligent image pattern matching techniques (that were used here) will empower dermatologists for automated recognition of skin diseases using the image patterns (even in remote healthcare scenarios). This would be useful for doctors to reduce diagnostic errors, while on the other hand it can serve as a initial test bed for end-users or patients in rural areas. These techniques could as well lead towards tools which could be used to provide a low cost and effective solution for fast recognition of skin diseases.

Would this project be considered an innovation, a best practice or other notable advancement that could be adopted by or tailored for other organizations and uses? If yes, please describe that here. (In 300 words or less.)

The current innovative implementation of technologies towards solving and automating the critical and well known Agricultural, Healthcare problems could be implemented towards solving multiple business problems across Industry domains. While the team already explored and implemented the techniques in the Agriculture domain and part of Healthcare domain, the team is also exploring the implementation of the same techniques towards the detection of neurological disorders in remote health care scenarios. Similar techniques could be going forward to be deployed towards identification and accurate prediction of climate changes through the analysis of satellite etc. image data.

If there are any other details that the judges should know about this project, please note them here. (In 300 words or less.)

The Lab implementations were successfully done and demonstrated internally to our Business Units while plans are in the pipeline both towards (a) real-time/on-field implementations of the explored use cases, i.e., Agriculture, Healthcare and exploring future applicability towards other industry segments (for example Satellite data for Climate changes, identification of defect materials in industries etc.).