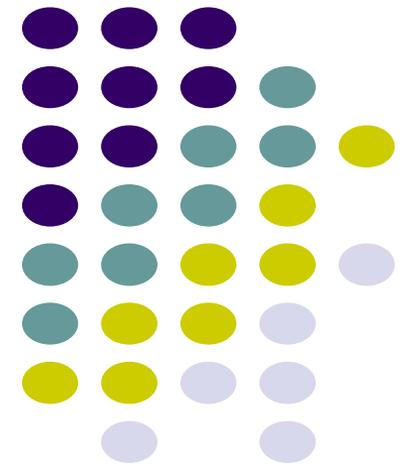
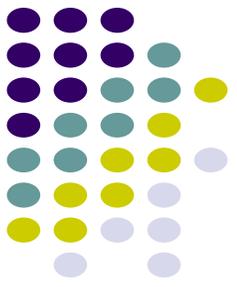
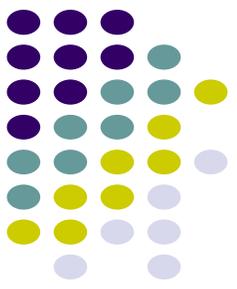


Artificial Intelligence (AI) based diagnosis





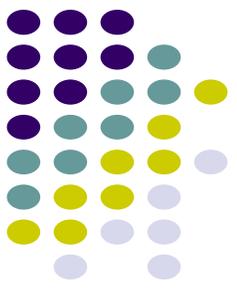
- The existing practice for plant disease detection is simply naked eye observation by experts through which identification and detection of plant diseases is done.
- For doing so, experts as well as continuous monitoring of plants is required, which costs very high. At the same time, in some countries, farmers do not have proper facilities or even idea that they can contact to experts.
- Due to which consulting experts even cost high as well as time consuming too.



- Use of technology to replace some of the human activities and guarantee efficiency is known as Artificial Intelligence (AI).

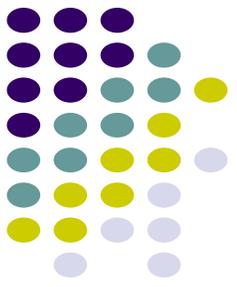


- Can Artificial Intelligence help improve agricultural productivity?

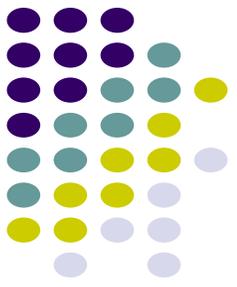


- **AI applications in agriculture**

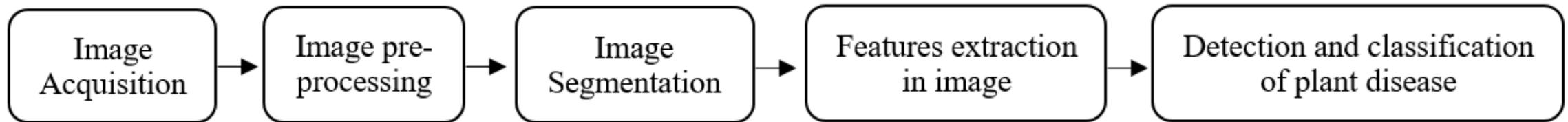
- Agriculture is slowly becoming digital and AI in agriculture is emerging in three major categories, (i) agricultural robotics, (ii) soil and crop monitoring, and (iii) predictive analytics. Farmers are increasingly using sensors and soil sampling to gather data and this data is stored on farm management systems that allows for better processing and analysis. The availability of this data and other related data is paving a way to deploy AI in agriculture.
- As a result a number of tech companies investing in algorithms that are becoming useful in agriculture. For example image recognition is used in potatoes by AgVoice developed by a Georgia-based startup for using natural language toolkit for field notes, and yield prediction algorithms based on satellite imagery.

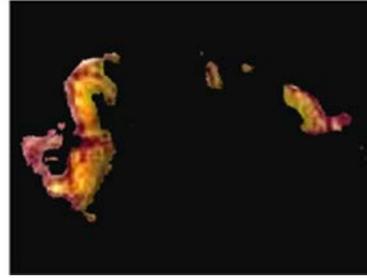
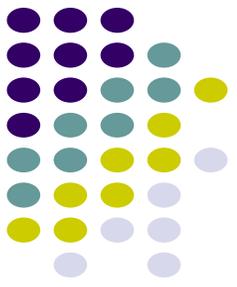


- Various researchers developed several AI devices that can identify diseases in plants.
- For example **TensorFlow** is a technique known for transfer learning to teach the AI to recognize crop diseases and pest damage. It uses Google's open source library to build a library of 2,756 AI images of cassava leaves from plants in Tanzania. The success was that the AI was able to identify a disease with 98% accuracy.

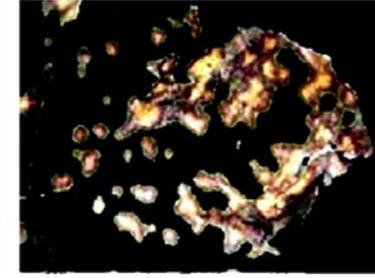


- Another technique is using of image segmentation and soft computing technique to detect plant diseases.
- Image segmentation is the process of separating or grouping an image into different parts. These parts normally correspond to something that humans can easily separate and view as individual objects. The segmentation process is based on various features found in the image. This might be color information, boundaries or segment of an image

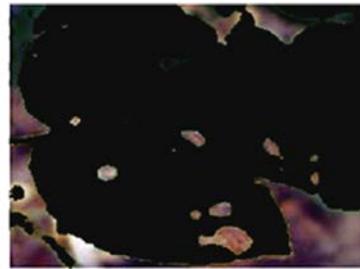




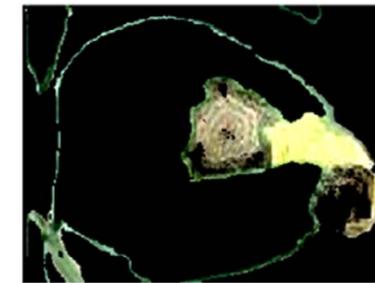
Input and output image of banana leaf and output diseases is early scorch disease



Input and output image of beans leaf and output diseases is bacterial leaf spot.

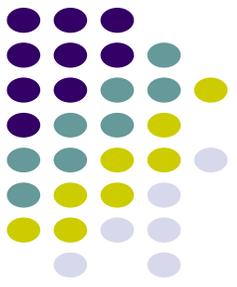


Input and output image of rose leaf and output diseases is bacterial leaf spot.

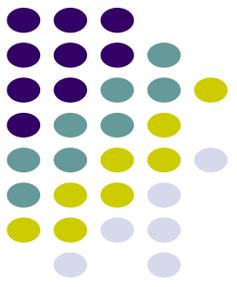


Input and output image of beans leaf and output diseases is fungal disease

iPathology: Robotic Applications and Management of Plants and Plant Diseases



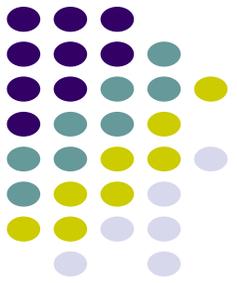
- **Robotic Precision Plant Protection**
- Intelligence technologies, using machine vision/learning, have been developed for plant disease detection and identification.
- A recognition method based on visible spectrum image processing to detect symptoms of citrus greening diseases (also named citrus Huanglongbing, HLB, caused by *Candidatus Liberibacter* spp.) on leaves. The experimental results showed the detection accuracy is as high as 91.93%. An HLB detection system can detect the pathogen at the pre-symptomatic stage utilizing polarized imaging.
- Citrus canker (*Xanthomonas axonopodis*) caused foliar symptoms were analyzed to evaluate the efficacy of image analysis. The image analysis was more accurate than visual raters for various symptom types



Use of mobile Apps

- **Plantix** is a free mobile application which offers farmers and gardeners the possibility to receive decision support directly on their smartphone. Due to image recognition, the **app** is able to identify the plant type - as well as the appearance of a possible disease, pest or nutrient deficiency.






plantix
SUCCESS STORY IN FOCUS

