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[21] Plant Leaf Disease Detection, Classification, and Diagnosis Using Computer Vision and Artificial Intelligence: A Review ANUJA BHARGAVA 1,AASHEESH SHUKLA1, OM PRAKASH GOSWAMI2, MOHAMMEDH.ALSHARIF 3,PEERAPONG UTHANSAKUL 4,(Member, IEEE), AND MONTHIPPA UTHANSAKUL 4,(Member, IEEE)

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**Etiology**

**Control & Management**

**Epidemiology**

**Pathogenesis**

**Phytopathology Objectives**



Peach - Bacterial Spot Bell Pepper - Bacterial Spot



Cassava - Bacterial Blight Potato - Bacterial Wilt



Watermelon - Mosaic Virus Tomato - Mosaic Virus



Cassava - Mosaic Disease



Potato - Late Blight (a) Potato - Early Blight (b)



Apple – Rust

|  |  |  |  |
| --- | --- | --- | --- |
|  | Datasets | Techniques | Accuracy increased (%) |
| Bin et al. 2017 [23] | 1053 – 13689 | PCA | 4.00 |
| Srdjan et al. 2016 [24] | 4483 – 33469 | Rotation | 3.00 |
| Nazki et al. 2020 [25] | 2789 | ARGAN | 5.20 |
| Tain et al. 2019 [26] | TeaImage | CycleGAN | 28.00 |
| Wu et. al. 2020 [27] | GoogleNet | DCGAN | 94.33 |
| Liu et. al. 2020 [28] | Grape | LeafGAN | 94.02 |
| Lin et al. 2019 [29] | 10820 – 32460 | Radial Blur | 3.15 |
| Arnal Barbedo 2019 [30] | 1567 – 46409 | Segmentation | 12.00 |

Deployment

Model Evaluation

Model Training

Model Implementation

Model Selection

Data Preprocessing

Data Collection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Class** | **Precision** | **Recall** | **F1-Score** | **Support** |
| Apple\_\_\_alternaria\_leaf\_spot | 0.96 | 0.8 | 0.87 | 56 |
| Apple\_\_\_black\_rot | 0.77 | 0.91 | 0.83 | 124 |
| Apple\_\_\_brown\_spot | 0.78 | 0.84 | 0.81 | 43 |
| Apple\_\_\_gray\_spot | 0.8 | 0.52 | 0.63 | 79 |
| Apple\_\_\_healthy | 0.81 | 0.65 | 0.72 | 514 |
| Apple\_\_\_rust | 0.8 | 0.62 | 0.7 | 248 |
| Apple\_\_\_scab | 0.56 | 0.45 | 0.5 | 244 |
| Cassava\_\_\_bacterial\_blight | 0.25 | 0.17 | 0.2 | 217 |
| Cassava\_\_\_brown\_streak\_disease | 0.32 | 0.28 | 0.3 | 438 |
| Cassava\_\_\_green\_mottle | 0.22 | 0.13 | 0.16 | 477 |
| Cassava\_\_\_healthy | 0.27 | 0.26 | 0.27 | 516 |
| Cassava\_\_\_mosaic\_disease | 0.73 | 0.84 | 0.78 | 2632 |
| Coffee\_\_\_healthy | 0.67 | 0.63 | 0.65 | 158 |
| Coffee\_\_\_red\_spider\_mite | 0.0 | 0.0 | 0.0 | 33 |
| Coffee\_\_\_rust | 0.44 | 0.53 | 0.48 | 120 |
| Corn\_\_\_common\_rust | 0.98 | 0.89 | 0.93 | 238 |
| Corn\_\_\_gray\_leaf\_spot | 0.78 | 0.64 | 0.7 | 103 |
| Corn\_\_\_healthy | 0.87 | 0.97 | 0.92 | 232 |
| Corn\_\_\_northern\_leaf\_blight | 0.86 | 0.9 | 0.88 | 197 |
| Grape\_\_\_Leaf\_blight | 0.98 | 0.98 | 0.98 | 295 |
| Grape\_\_\_black\_measles | 0.93 | 0.82 | 0.87 | 534 |
| Grape\_\_\_black\_rot | 0.97 | 0.93 | 0.95 | 316 |
| Grape\_\_\_healthy | 0.93 | 0.92 | 0.93 | 341 |
| Potato\_\_\_bacterial\_wilt | 0.63 | 0.59 | 0.61 | 114 |
| Potato\_\_\_early\_blight | 0.88 | 0.88 | 0.88 | 526 |
| Potato\_\_\_healthy | 0.75 | 0.69 | 0.72 | 455 |
| Potato\_\_\_late\_blight | 0.76 | 0.8 | 0.78 | 417 |
| Potato\_\_\_leafroll\_virus | 0.98 | 0.76 | 0.86 | 105 |
| Potato\_\_\_mosaic\_virus | 0.75 | 0.84 | 0.79 | 133 |
| Potato\_\_\_nematode | 0.27 | 0.21 | 0.24 | 14 |
| Potato\_\_\_pests | 0.36 | 0.35 | 0.36 | 122 |
| Potato\_\_\_phytophthora | 0.51 | 0.61 | 0.56 | 69 |
| Potato\_\_\_spindle\_tuber\_viroid | 0.81 | 1.0 | 0.89 | 17 |