6 Maize Leaf Disease Detection and Classification Using Deep Learning

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6.1 INTRODUCTION

Zea mays L., which is the binomial name for maize, is the most cultivated cereal crop globally, surpassing the production of rice and wheat, and is recognized as the queen of cereal crops. Maize is cultivated in about 190 million hectares across 165 countries with a 39% share of global grain production. Maize is the third largest crop produced in India after rice and wheat. It is predominantly a Kharif season crop, which accounts for 10% of total food grain production in India. Although the direct consumption of maize by humans is less, it is being used as a raw ingredient in a wide range of products such as oil, starch, protein, alcoholic beverages, cosmetics, textile, food sweeteners, gum, packaging and paper industries. Hence, there is a dire need for smart farming method for early detection and control of crop diseases in maize to produce better yield. Deep learning-based models such as the convolutional neural network (CNN) have been found to pattern better the type of disease from the input images with a good classification accuracy [1–12]. Some of the commonly found corn diseases such as grey leaf spot (GLS), corn rust and northern leaf blight, which have a profound impact on the yield per hectare, are presented in this chapter. The causes of diseases, early symptom detection and their impact on the yield per hectare have been thoroughly discussed. The diseased leaf is compared with healthy maize leaf shown in Figure 6.1 for the present study.

FIGURE 6.1 Healthy maize leaf.

6.2 TYPES OF MAIZE LEAF DISEASES

6.2.1 GREY LEAF SPOT

GLS, known usually as Cercospora leaf spot, is a corn disease in which maize leaf is found to have grey spots. It is a common fungal disease. The picture of GLS diseased maize leaf is shown in Figure 2(a). GLS is a common disease in the maize crop which is caused by a pathogen *Cercospora zeae-maydis*, hence the name Cercospora leaf spot. Warm temperatures and high humidity conditions are more favourable for the spreading of this GLS disease [1, 2]. The spreading rate of this disease is more towards the end of the summer season. Grey spots begin to appear as small necrotic spots with chlorotic halos, with colourations from tan to brown beginning to appear before sporulation. As the infection progresses, lesions begin to grow and are restricted by parallel veins in the leaves. As GLS progresses, lesions will coalesce and form larger necrotic areas. GLS lesions hinder the photosynthesis process,