# USING CONVOLUTIONAL NEURAL NETWORKS FOR DIAGNOSING PLANT HEALTH BASED ON IMAGE ANALYSIS

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Plant diseases pose a significant threat throughout the plant growth cycle. Accurate and timely diagnosis of plant diseases is an integral part of modern plant care. Traditional approaches to plant disease diagnosis rely on expert consultations or manual use of reference materials. They are time-consuming and often inaccessible to home users. To diagnose indoor plant diseases from their images and provide personalized care recommendations, a mobile application DPH (Diagnostics of Plant Health) was developed using a convolutional neural network [1].

The dataset includes images that contain the type and severity of relevant plant diseases such as leaf spot, powdery mildew, and late blight. Advances in deep learning have led to the creation of image segmentation models that provide not only classification but also fairly accurate localization of diseased areas of plants. To further support the development of segmentation models, the images were segmented and masks were created to manually classify the diseased areas. The U-Net model used for segmentation significantly outperforms baseline methods in the segmentation task, but has a drawback - the segmentation model generates pure graphical abstractions of the plant health status [2].

The dataset is split into training, validation, and test sets with a standard 80/10/10 split. During training, the model achieved 92% classification accuracy and demonstrated effective performance in image segmentation for locating diseased areas on leaves and stems with an IoU score of 85%.

The model's performance was evaluated in both classification and segmentation tasks using the following metrics: accuracy, precision, and IoU.

Unlike most existing crop-oriented systems, the DPH mobile app is designed to recognize and treat houseplant diseases. The app is user-friendly and supports multilingual interfaces, making it accessible to a wider audience. A tool such as Grad-CAM is used to interpret the model and visualize its results.

Thus, the DPH mobile application allows users to monitor the condition of plants, receive expert-level information and take preventive measures without requiring special knowledge. The results of both the classification and segmentation models demonstrate high performance on key metrics.

**References:**

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2.Ronneberger, O., Fischer, P., Brox, T. (2015). U-Net: Convolutional networks for biomedical image segmentation. *arXiv preprint arXiv:1505.04597*.