# 基于计算机视觉技术的温室黄瓜叶片营养信息检测

# Nutrition information extraction of the cucumber leaves in the greenhouse based on computer vision technology

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中文摘要：

应用计算机视觉技术研究了诊断温室作物营养状态的方法。在日光条件下采集了温室黄瓜叶片图像，然后分别提取了红绿蓝(RGB)三色分量和它们的相对系数rgb，以及色度、饱和度和亮度指标(HSI)。在RGB和HSI颜色模型下分析了各分量与叶片含氮率、含磷率和含水率之间的相关特性。分析结果表明：叶片绿色分量G和色度H分量与氮含量线性相关，可用作利用机器视觉快速诊断作物长势的指标，而其它分量与氮含量没有明显的相关性；颜色各分量与磷含量和水分含量均没有表现出明显相关关系；在对单次数据进行分析和比较时发现在同一光照条件下，绿色分量G和色度H与氮含量之间存在较好的线性相关特性，而当光照条件不同时，对两变量之间的线性关系存在一些影响，需要在进一步的试验研究中通过使用人工光源和系统标定的方法改进，以提高线性回归的精度。

英文摘要：

The method to diagnose the growth conditions of cucumber in greenhouse was studied with the machine vision. The images of the cucumber leaves were taken under the sunlight condition, then the red, green, blue (RGB), their relative ratios (r, g, b), and the hues of the images were calculated. And the correlations among nitrogen, phosphorus and water content of the leaves and their color parameters were analyzed using the RGB and the HSI model. The result shows that there are high linear correlations between the nitrogen content and the green weight, and between the nitrogen content and the hue so that two parameters could be used as the indices of the growth for the fast diagnosis using machine vision. Whereas the other color weights had not so high correlation with the nitrogen. It was observed that the color weights did not have obvious correlations with the phosphorus and water content. Additionally, it was found that different light conditions could have an effect on the linear relationship between the nitrogen content and the green weight or hue. So the method needs to be improved for higher precision of the linear regression through further experiments under the artificial light source and the system calibration.

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