UTILIZATION OF COMPUTER VISION FOR ONION (*Allium cepa*) DISEASE IDENTIFICATION

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ACCEPTANCE SHEET

This undergraduate thesis entitled **"UTILIZATION OF COMPUTER VISION FOR ONION (*Allium cepa)* DISEASE IDENTIFICATION,"** prepared and submitted by **LEO P. SARMIENTO Jr.** and **JOYCE ANN S. SOLOMON**, in partial fulfillment of the requirements for the degree of **BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING (AB LAND AND WATER RESOURCES ENGINEERING),** is hereby accepted:

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BIOGRAPHICAL SKETCH

Leo P. Sarmiento Jr was born on October 14, 2000, in Rizal, Nueva Ecija, the fifth child of Mr. Leo A. Sarmiento Sr. and Mrs. Sally A. Sarmiento, having a younger brother, older brother, and three older sisters.

Leo's academic journey commenced at Rizal Central School, where he demonstrated exceptional aptitude. He completed his elementary education in the academic year 2012-2013. Continuing his quest for knowledge, Leo transitioned to Rizal National High School for his secondary education. He achieved another milestone in his academic journey, finishing his secondary education in the school year 2018-2019.

Now at present, Leo is a young man with a vision. He aspires to become a licensed agricultural and biosystems engineer, aiming to make a substantial contribution to the development of the agricultural sector in the Philippines. His goal is to utilize his knowledge and skills to design and implement innovative solutions that address the challenges faced by farmers and rural communities.

Looking ahead, Leo harbors dreams of pursuing further studies and research in the field of agricultural and biosystems engineering. He believes that with hard work, passion, and dedication, he can achieve her goals and make a positive impact on society. The journey of Leo P. Sarmiento Jr is not merely a chronological progression but a narrative of dedication, achievement, and a future poised for meaningful contributions to her chosen field and society at large.

BIOGRAPHICAL SKETCH

Joyce Ann S. Solomon, born on November 23, 2000, in Tabacao, Talavera, Nueva Ecija. Raised in a family where the values of hard work and determination were instilled from an early age, Joyce Ann is the proud daughter of Francisco and Marilyn Solomon. She shares her life's journey with five siblings, all actively pursuing their paths in career, family, and education.

The foundations of Joyce Ann's academic journey were laid at San Jose Elementary School, where she completed her primary education in 2012-2013. She studied at Tabacao National High School for her secondary education, where her dedication to excellence garnered her the Honors Award in the school year 2018-2019.

In 2019, Joyce Ann achieved a significant milestone by gaining admission to her dream university, Central Luzon State University. She enrolled in the Bachelor of Science in Biosystems Engineering, majoring in AB Land and Water Resources Engineering.

Looking ahead, Joyce Ann harbors dreams of furthering her studies in the field of agricultural and biosystems engineering. Beyond academia, she envisions establishing her own agricultural-based business, where she can apply her acquired expertise to contribute to the sustainable development of the agricultural sector. With the belief of hard work, dedication, and determination she believes she can achieve her goals and make a positive impact on her field and society.

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ABSTRACT

SARMIENTO, LEO JR. P., SOLOMON, JOYCE ANN S., Department of Agricultural and Biosystems Engineering, Collage of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines, **DECEMBER 2023, UTILIZATION OF COMPUTER VISION FOR ONION (*Allium cepa*) DISEASE IDENTIFICATION.**

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Onion (*Allium cepa L.*), locally referred to as "sibuyas," stands as a pivotal culinary ingredient, playing a fundamental role in the quintessential seasoning of dishes. Within the Philippines, the cultivation of onions has thrived, positioning it as one of the top-performing crops and a prized agricultural commodity. Despite its paramount importance, the onion crop grapples with vulnerability to an array of plant diseases, posing a considerable hindrance to the optimal production of onions in the region. This susceptibility underscores the need for strategic interventions and research to safeguard and enhance onion yields in the face of these agricultural challenges.

The study considers the use of the camera as a sensor, incorporating elements of computer vision and machine learning. The primary focus is on leveraging these technologies to identify a spectrum of diseases commonly affecting onions. These diseases encompass Botrytis Leaf Blight, Downy Mildew, Purple Blotch, Onion Rust, Stemphylium Leaf Blight, and Xanthomonas Leaf Blight.

The result shows the overall accuracy of the developed system is 94% indicating that the model performs well in general. The Precision, Recall, and F1-Score for each class are in the range of 0.89 to 0.96. In terms of model training and validation, the training loss decreases from 0.8 to 0.1, and the validation loss decreases from 0.9 to 0.2 over the epoch.

This indicates an improvement in the model's performance on the training data and suggesting generalization to unseen data. In terms of calibration, the model prediction probability is less than the true outcome indicating good calibration.

Keywords: onion; computer vision; disease identification; CNN

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