

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

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An Undergraduate Thesis Submitted to the Faculty of the Department of Agricultural and
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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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TABLE OF CONTENT

	PAGE
LIST OF TABLES	x
LIST OF FIGURES	xi
LIST OF APPENDIX TABLES	xiii
LIST OF APPENDIX FIGURES	xiv
ABSTRACT	xv
INTRODUCTION	1
Background of the Study	1
Statement of the Problem	2
Objectives of the Study	3
Significance of the Study	3
Scope and Limitation of the Study	4
Time and Place of the Study	4
REVIEW OF RELATED LITERATURE	5
Onion	5
Common Onion Disease	6
Damping-off	7
Botrytis Leaf Blight	8
Purple Blotch	8
Downey Mildew	10
Stemphylium Leaf Blight	11
Onion Rust	12
Xanthonomos Leaf Blight	13
Botrytis Neck Rot	15
Onion Smut Fungus	16
Bulb Soft Rots	17
Anthracnose	18
Onion Yellow Dwarf Virus	19
Iris Yellow Spot Virus	19
Thrips	20
Computer Vision	21
Different Types of Computer Vision	22

Image Segmentation	23
Object Detection	23
Image Classification	24
Feature Matching	24
Machine Learning	24
Convolutional Neural Networks (CNNs)	26
Internet of Things (IoT)	27
Artificial Intelligence	27
Intelligent Automation	28
Sensor	29
Smart Farming	30
Confusion Matrix	31
METHODOLOGY	32
Conceptualization of the Study	32
Computer Vision Flowchart	34
Image Dataset	34
Data Annotation	35
Data Augmentation	35
Disease and Pest Detection (Deep Learning)	35
Design Consideration	36
Propose Web UI Interface	37
Onion Disease Detection	37
Convolutional Neural Networks	38
Data Gathering	39
Gathering of Onion Sample	39
Calibration	41
Statistical Data Analysis	41
Confusion Matrix	41
RESULTS AND DISCUSSIONS	45
Class Distribution	45
Experimental Set-Up	46

Image Data Set Preparation	46
Collected Images	47
Model Evaluation Metrics	49
Accuracy	49
Precision, Recall, F1-Score	49
Confusion Matrix	49
Model Training and Validation	51
Training vs. Validation Loss	51
Learning Rate Analysis	52
Data Calibration	52
Calibration Curve	52
Overall Analysis	52
Model Evaluation Metrics	54
Accuracy	54
Precision, Recall, F1-Score	54
Confusion Matrix	56
Model Training and Validation Result	58
Training vs. Validation Loss	58
Learning Rate Analysis	59
Calibration Curve	60
Predicted vs. True Outcome Probability	61
Simple Cost Analysis	62
SUMMARY, CONCLUSION, AND RECOMMENDATION	68
Summary	68
Conclusion	70
Recommendation	71
LITERATURE CITED	72
APPENDICES	75
Appendix Tables	76
Appendix Figures	82

LIST OF TABLES

TABLE		PAGE
1	Parameters and specifications in gathering data	40
2	Distribution of images across different classes in the dataset	53
3	Precision, recall, and F1-score for each class	55
4	Confusion matrix	57
5	Training vs. validation loss over epochs	59
6	Learning rate analysis over epochs	60
7	Predicted probability and true outcome probability	61
8	Assumptions used on the cost analysis of the system	62

LIST OF FIGURES

FIGURE		PAGE
1	Dumping off	7
2	Botrytis Leaf Blight	8
3	Purple Blotch	9
4	Downy Mildew	11
5	Stemphylium Leaf Blight	12
6	Onion Rust	13
7	Xanthonomos Leaf Blight	14
8	Neck Rot	15
9	Onion Smut Fungus	16
10	Bulb Soft Rots	17
11	Anthracnose	18
12	Onion Yellow Dwarf Virus	19
13	Irish Yellow Spot Virus	20
14	Thrips	21
15	Schematic diagram of CNN	26
16	Conceptual framework of the study	33
17	The detailed model of data training for computer vision	34
18	Propose Web UI Interface	37
19	Visualization of CNN layer	38
20	The detailed model of data training for computer vision	39
21	Confusion matrix model for machine learning	42

22	Class distribution for Training data	45
23	Experimental set-up	46
24	Onion images data set	47
25	Healthy onion data set	47
26	Graphical illustration of Precision, Recall, and F1-Score for each class	55
27	Graphical illustration of confusion matrix	56
28	The graphical illustration of Training vs Validation loss over epochs	58
29	The graphical illustration of learning rate analysis over epochs	59
30	Calibration curve of the Outcome probability and Predicted probability	60

LIST OF APPENDIX TABLES

APPENDIX TABLE		PAGE
1	Agriculturist intervention for Botrytis Leaf Blight of onion	76
2	Agriculturist intervention for Purple Blotch of onion	77
3	Agriculturist intervention for Downy Mildew of onion	78
4	Agriculturist intervention for Stemphylium Leaf Blight of onion	79
5	Agriculturist intervention for Onion Rust	80
6	Agriculturist intervention for Xanthonomos Leaf Blight of onion	81

LIST OF APPENDIX FIGURES

APPENDIX FIGURE		PAGE
1	Experimental setup	82
2	Gathering onion images sample	82
3	Gathered onion images and disease image datasets from BPI	83
4	Software and extensions installation	84
5	Model training and validation	84
6	Testing the system developer interface	85
7	System prediction and recommendations	85
8	Requested letter for onion disease data images	86
9	User interface of computer vision for onion disease identification system	87

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.**

Adviser: ELIZA E. CAMASO, M.Sc.

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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