PROJECT REPORT

REAL MASS ESTIMATION USING DENSITY-BASED SPATIAL CLUSTERING OF APPLICATIONS WITH NOISE (DBSCAN) AND K-NEAREST NEIGHBOUR CLASSIFICATION

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2022

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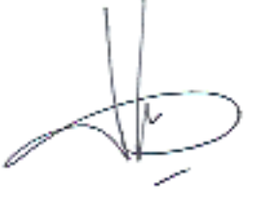

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ACKNOWLEDGMENT

My first yet big appreciation, I would like to express my sincere gratitude to my supervisors Hironimus Leong, S.Kom., M.Kom. for constant support and help during the writing of this thesis. Without his great feedback and excellent guidance this thesis would not have been completed.

Last but not least, I would give my warm but heartfelt thanks to my friends and family for showering their tremendous love and hope with excellent valuable suggestions whenever I need them. Thank You all for the strength you gave me.

Semarang, January, 10, 2022

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ABSTRACT (Style : Abstract Title)

Many real-world applications can be acquired from efficient and effective mass measurement. However, further development is needed for our current mass measurement. Estimating an object's mass through the naked eye is not possible and it's very inconvenient to bring a measurement scale everywhere just to calculate the mass of an object. The proposed study shows that there's no need for human intervention to calculate an object's mass by placing the object one by one into the mass scales, it can be done just by taking pictures of them.

Using the object's top view and side view photos, the object's mass can be found. Image processing is needed to achieve a clean edge of the object and replace the object's background with transparency. There are two sections in this model which are object identification and object volume measurement. In the object identification model, processed side view image will be combined with the train data and clustered by the DBSCAN algorithm. A selected cluster of the input image will be used as k-NN classification train data. k-NN will find the nearest neighbor of the input image among the input image's cluster. The object is identified and the object's density is obtained.

In the volume estimation model, an area calculation and height estimation are required. Object's area is obtained by calculating the non-zero pixels of the thresholded object's top view. While object's height is estimated by drawing a bounding box around the object of the object's side view image. After the object's area and height are obtained, multiplying them will get the object's volume. Object's density and an object's volume have been acquired and by multiplying them, the object's mass is calculated.

It was found that this model is able to estimate an object's mass with acceptable error due to small datasets and manual measurements which increase the possibility of human error. The average accuracy of multiple applications reaches 90,2% and this model works best with light color objects. The highest accuracy is obtained with a 19 cm distance from the camera to the object.

Keyword: mass measurement, image processing, object identification, object's density, volume estimation.

TABLE OF CONTENTS

LIST OF FIGURE

LIST OF TABLE