

1. Introduction

Monkey is a term for primate members that is not a type of prosimian [1] ("pre-ape) or monkeys from the old and new worlds. Currently, only 260 species of monkeys are known to live in the world. With many monkey types and fur color almost the same, it is very difficult to distinguish the types of monkeys. Through that problem, the author wants to create a program that can distinguish the types of monkeys using computer vision. Previously experts were needed to do the classification, with the invariant reason, biology and Physical Science always enjoy excellence in this[2].

In the discussion [3], mentions that the monkey's intelligence is equivalent to toddlers or children aged 3 years in solving greetings, monkeys can also understand abstract objects. In tests [3], a trial was carried out. The research published in PLOS One involved a box containing two pieces of rope, one cut and one unbroken that connected to food, another experiment was also carried out with the same goal of one box being closed while being another opens to allow the monkey to see that the rope is connected to food. The researchers said the study showed that monkeys, apes, and young children had difficulty learning what to do with an object unless they could see its function directly. Individuals of all species work better in objects seen or done by someone because it "makes sense" because they can see the thread connected to food. Monkeys also have feelings of self-doubt [4].

The author concludes that monkeys are intelligent creatures and monkeys are unique animals because their intelligence is almost equal to humans but in only a few fields. In the future animals and humans continue to evolve, so there may be monkeys with new species so that if the monkeys have been previously classified species, then finally humans can conclude whether the type of monkey caught on camera can be concluded that the monkey is an old type or type of monkey new.

In classifying experiments on Animal Species [29], the classification obtained results of 95% of 5 class cattle using the GLCM extraction feature. Other experiments were also carried out with all types of animals with Appearance Based Features combined with GLCM and SVM [6], the accuracy obtained was 99.97% since author problem still no one that doing the experiment from journal thus by the reference tracing, the authors conclude that the technique to be used is the method of extracting is grey-level co-occurrence matrix (GLCM) feature and color histogram, while the classification process is carried out using the Support Vector Machine (SVM) as the main method. For classifier such as K-NN and Random Forest will be set as comparison to check whether classifier author pick already correct.

1.1. Problems and Boundaries

Based on the introduction described above, the problem formulation of this Final Project is listed below:

1. How to build a classification system that can distinguish monkeys from other monkeys with texture based on an image using the grey-level co-occurrence matrix and Color Histogram using the mean method with the classification process using the Support Vector Machine method?
2. Does the combination of GLCM and Color Histogram already good ?
3. Is SVM already good classifier for this problem why not use such as K-NN and Random forest?

The limitation problem of this Final Project is:

1. The dataset used is a dataset from Kaggle and it is open source
2. There are 5 classes of monkeys classified in this final project, namely *Alouatta palliata*(Mantled howler monkey), *Erythrocebus patas*(Patas monkey), *Cacajao calvus*(Bald uakari), *Macaca fuscata*(Japanese macaque), *Trachypithecus johnii*(Nilgiri langur)
3. The total dataset used is 530 datasets with format file JPG with focus on head and with dimensionaonal 100x100 pixels.

1.2. Goals

The objective of this final project is to able build a classification system based on monkey images using the grey-level co-occurrence matrix and Color Histogram using the mean method with the classification process using the Support Vector Machine method and Developing existing journals [5][28] towards different objects and specific animals. The system should be able to distinguish between types of monkeys, also did the classifier already pick the best performance, so the system will also compare it to other classifier such as K-NN and Random Forest.

1.3. Writing Organize

This paper is organized as follows. Related studies will be discussed in Chapter 2. The system design will be discussed in Chapter 3. System evaluations will be discussed in Chapter 4 and in Chapter 5 the conclusions of this paper will be written.