Cat's Nose Recognition Using You Only Look Once (Yolo) and Scale-Invariant Feature Transform (SIFT)

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***Abstract* – This paper proposes a cat recognition system through cat's nose using You only look once (Yolo) and Scale-Invariant Feature Transform (SIFT). For first part, this system detects the nose of a cat image using Yolo. After the nose is detected, we recognize the cat's nose using SIFT method and make sure that the nose has been recognized correctly. The accuracy of the nose detection is 99.85% for the first dataset which contains 700 images and 96.89% for the second dataset that contains 677 images. This system work with several step and do automatic. The cat's nose recognition system was tested by 1337 cat's image and 700 cat's nose images as reference data. Finally, the average accuracy of this system is 95.87%.**

Keywords – Yolo, Scale-Invariant Feature Transform (SIFT), cat's nose detection, cat recognition, cat's nose recognition.

I. INTRODUCTION

Cats are very common pets as their global population is almost 600 million. American Veterinary Medical Foundation (AVMA) in 2012 [1], explain about almost 84 million American households have a pets where almost 40% of them owned cats. Moreover, at least once in 5 years, 15% of cat owners lose their pets period [2]. However, only 38% of people were as able to re-unite with their pets, out of which just 3% of them are cats [3]. The problem is that the owner cannot recognize their pets. In particular, previous studies have work a research about identify individual animal using their biometric identifier. One previous research proposed a cat-head detection algorithm using a joint shape and texture detection approach to effectively exploit the shape and texture feature [4]. The nose of cats is a unique part for each individual which has similarity to human fingerprint for human identification [5].

II. PROPOSED SYSTEM

A. System Overview

In this part, this system divided in two part: cat nose detection and cat nose recognition which the scheme of this system is shows at Fig 1. In this proposed system, after reading the image, the system will firstly detect cat's nose using Yolo in Darknet. Secondly, after the nose is successfully detected, then it will recognize the nose with the database image. At the last, the accuracy of recognition will show in the system.

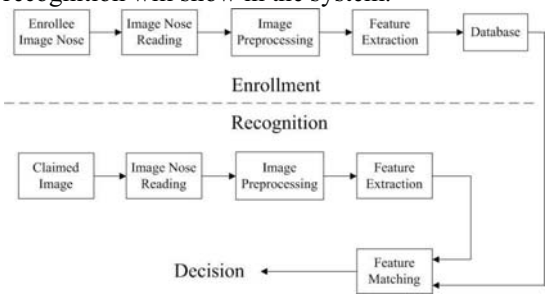

Fig 1. Recognition Scheme

B. Cat's Nose Detection

One of famous real object detection system that state-of-the art is You only look once (YOLO). Here we used two datasets for this system. The first dataset is from one previous research that is about cat nose recognition [3]. This dataset consists of 700 images as the original images and therefore 700 cat's nose images from totally 70 different cats. The second dataset consist of 677 images which we collected from some website. For the detection, we used Yolo version 2 and Darknet as a neural network framework, and python as the programming language

C. Cat's Nose Recognition

After the nose is successfully detected, then we crop the nose from the image. Next, we put in the database as an image reference for recognition. Finally, we do the recognition which looks for the similarity between cat image and cat's nose image as data reference using SIFT method with k-NN algorithm for find a good match.

III. EXPERIMENTAL RESULT

This section shows the experimental result of the system. Our system was tested 1337 images of cat. The first dataset is with a good resolution than the second dataset. Fig 2 and fig 3 shows the result of cat's nose detection of each dataset. For the result of cat's nose recognition, it is shown in fig 4 and fig 5. Moreover, the accuracy of cat's nose recognition is 95.87%, which is better than the previous research of cat's nose recognition [5].

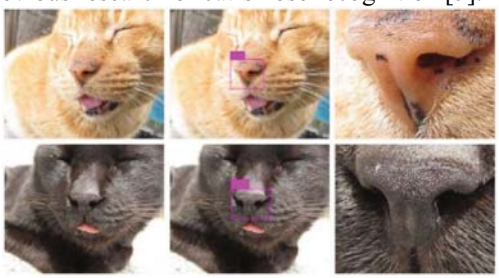

Fig 2. The example of cat nose detection from the first dataset

Fig 3. The example of cat nose detection from the second dataset

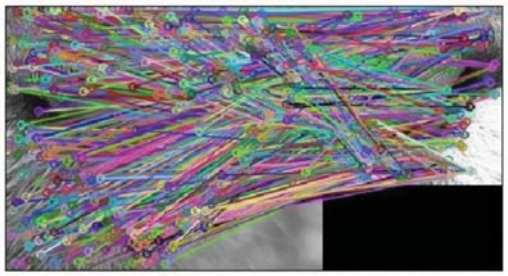

Fig 4. The example of cat nose recognition from the first dataset

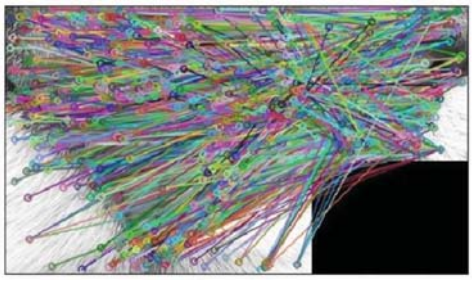

Fig 5. The example of cat nose recognition from the second dataset

IV. CONCLUSION

As summary, biometric identification will present as the propose system with exploiting visual information of their noses. This system using Yolo version 2 for detecting the nose of a cat and SIFT for recognizing a cat. This system contains two databases with one of a better resolution than the other. The result shows that the accuracy of cat's nose detection is 99.99% (first dataset) and 96.89% (second dataset). Moreover, the accuracy of the cat's nose recognition is 95.87% For future works, a cat's recognition system will be developed and it will be applied as a mobile application.

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