Cat Identification Service Using Nose Pattern Recognition

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ABSTRACT

Recently, as the number of households raising companion animals increases, the occurrence of abandoned animals is also increasing. In particular, in the case of cats, the status of abandonment is rapidly increasing. However, it is difficult to manage because there is no official authentication method to identify pets. In this paper, we propose a system that learns nose pattern recognition with YoloV5 to generate models, recognizes the nose pattern area using the learning model, and compares the nose pattern using feature point matching in the recognized nose pattern area to recognize cat information.

KEYWORDS

Object Classification, YoloV5, Feature matching, Nose Pattern

1 INTRODUCTION

As the number of abandoned animals increases as the number of households raising pets increases, various policies are being promoted accordingly. The UK mandates microchip transplants to prevent theft of rapidly increasing cats. Identification and registration services using built-in chips and external necklaces exist, but it is difficult to identify them if they are repulsed or lose necklaces.

In addition, the size of the pet market is increasing significantly every year, and various products that combine IT as well as feed, medical treatment, and beauty are being released. However, since there is no public authentication means capable of identifying pets, there is a cost problem when using such an IT combination service. Therefore, in this paper, we propose a service for recognizing the nose region using YoloV5 and for recognizing cats by measuring the similarity between nose pattern through feature point matching in the recognized nose region.

2 EXPERIMENTAL RESULT

2.1 Methodology

[1]uses a model utilizing VGG16, recognizing the nose pattern, [2] applies a RANSAC algorithm to reduce errors due to reflected light, and [3] proposes a local technician who can describe feature points in the nose pattern image.

Figure 1 shows the process of recognizing cat information based on inscription recognition used in this paper.

We use roboflow[4] to label the nose region and use YoloV5[5] to learn the nose region and generate a learning model. When a new cat image is input, the nose region is extracted using the learned model, and the extracted nose region is extracted using a feature point extraction algorithm. The extracted feature points are compared with the existing image to calculate the matching degree and show the information of the cat with the highest matching degree.

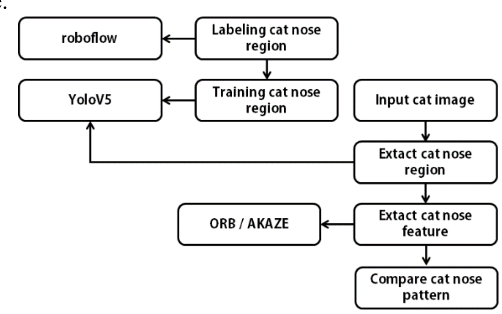


Figure 1: Proposed service flow diagram

2.2 Data Description

The data used 2,000 images with clear nose pattern from 9,000 images, including kaggle's cat data set[6], cat images collected through Google search, and cat images taken directly.
The shape of the nose was labeled using roboflow, and model learning was performed by dividing training, verification, and test data by 7:2:1.

2.3 Result

The setting of the YoloV5 was 200 for Epoch, 16 for batch size, and the model used was YoloV5-s for learning the nose area.
To extract the feature points of the nose pattern, grayscale conversion, edge detection, and binarization are performed on the image of the nose region extracted with the YoloV5 model.

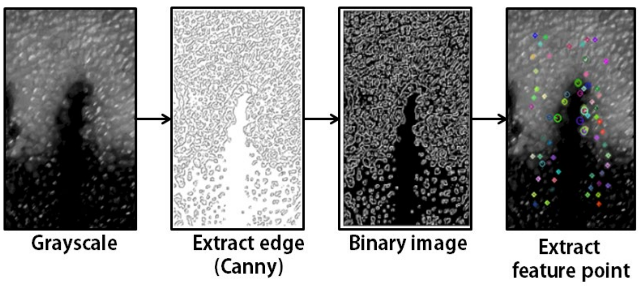


Figure 2: Nose area pre-processing method

Three kinds of cat images were used for the experiment, and the BFMatcher() function of the OpenCV library[7] was used to perform feature point matching. In addition, as a result of determining only the top two matches parameters in the drawMatches() function, it was found that the performance was superior to that of using the entire feature point.

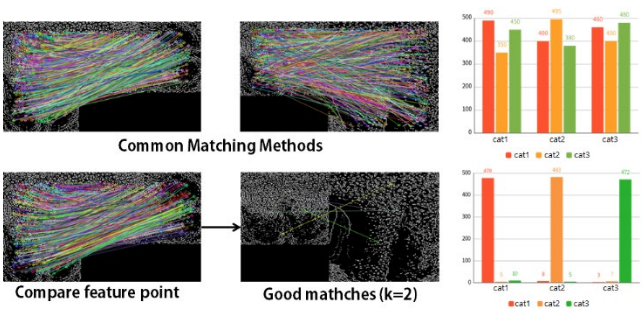
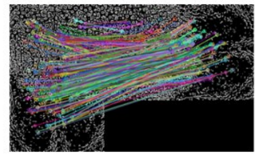
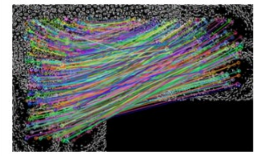


Figure 3: Results of using only two top matching value on matched feature points

For feature point matching, the ORB algorithm and AKAZE algorithm of OpenCV[8] were applied and tested. As a result of the experiment, the AKAZE algorithm performed better at precision, recall, and F1-score.

Table 1: Accuracy Comparison by Feature Point Matching Algorithm

	ORB	AKAZE
Result		
Precision	0.88	0.92
Recall	0.79	0.90
F1-Score	0.833	0.910

3 CONCLUSIONS

In this paper, the proposed service can automate leg length discrepancy diagnosis. Through this, it is possible to expect a reduction in the subjective judgment or reading time of the doctor. In addition, it can be used for predicting and diagnosing various diseases.

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