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KYON: DOG BREED CLASSIFIER AND OFFSPRING GENERATOR USING COMPUTER VISION

Rationale/ Introduction

In the evolving field of computer vision, one area that remains under-explored is the accurate classification of dog breeds and prediction of their offspring traits. Despite the advancement in image recognition, the specific application for comprehensive dog breeds identification and offspring outcome forecasting presents a significant gap. This is notably important in applications ranging from veterinary genetics to responsible breeding and pet ownership. Current solutions may lack in accuracy, breed specificity, or are not geared towards predicting the characteristics of future litters, based on recommendations from existing studies in the domain.

To bridge this research gap, the proposed KYON system promises to leverage cutting-edge machine learning algorithms and extensive image datasets to deliver a robust breed classifier. By integrating a deep learning architecture that's been meticulously trained on a diverse array of dog images, the system is designed to recognize nuanced breed characteristics with a high degree of precision. Furthermore, our novel approach will deploy genetic principles within our computational model to estimate potential offspring outcomes, a feature that remains largely absent in existing technologies.

The implementation of KYON stands to revolutionize how breeders, veterinarians, and dog lovers understand and engage with breed information. It's not only automates the arduous task of breed classification but also aids in predicting genetic diseases, breed specific traits, and the appearance of offspring. This innovation is poised to offer significant contributions to genetic research, improve breeding programs, enrich dog databases, and ultimately enhance the welfare of dogs by providing insights into health and heritage.

In conclusion, the KYON effort is expected to bridge a significant gap in the field of computer vision applications for animal husbandry and genetics. It is the next big step toward combining AI-powered remedies for biological problems. The scientific community's comprehension of genetic algorithms will be strengthened by the KYON system's decisiveness in identifying dog breeds and forecasting the qualities of their offspring. It will also set new standards for the use of technology in veterinary sciences and animal

breeding. The likelihood that KYON will have a significant influence and enhance computer science is what convinces us.

Significance of the Study

Dog Breeders. Dog Breeding is known to be a lucrative and sensitive business among enthusiasts as a specific breed of dogs, if properly maintained and well taken care of, may yield high prices, with some breeds pricing as high as USD8,000 or roughly PHP390,000 (Jeng, 2019). This system aimed to help dog breeders by helping them predict the possible offspring of the dogs they want to breed for them to be able to yield dogs that can be sold or traded for a fairly high price. The dog's breed will let the breeders know how to handle them, and they will be able to tell their customers how to train them properly.

Dog Owners. People would like to know what breed the other dogs are, other than their own. It is also helpful for them to know the type of dog they want their dog to mate with, making this application helpful. It produces the possible offspring of two dogs, depending on their breed. It can also be beneficial for owners to know the breeds of their dogs because it will tell them about the dogs' behavior, attitude, and training needs.

Dog Sellers and Pet Shop Owners. In the United States, the pet industry (including the sale of dogs and dog-related items) gained $99 billion in total sales in 2020 alone (Puac, 2021). Merchants can benefit from this application, for they would be able to calculate the possible offspring of different breeds of dogs, making it easy to reproduce the breed they want to have. This can help their businesses gain profit.

Future Researchers. Future researchers can benefit from this application, for they could further enhance it with more features other than just determining the breed of the dog and its possible offspring. They could add a function such as detecting the dog's health condition and suggest possible treatment

Scope and Limitations of the Study

The KYON system is designed to assist users in identifying dog breeds and predicting the potential appearance of their offspring using computer vision. It will function as a mobile application that allows users to upload images or use a live video feed for breed classification. The system will rely on a deep learning model to analyze visual characteristics and match them with known breeds in its database. Additionally, KYON will generate

possible offspring appearances by blending features from two parent dogs, offering a visual prediction of how their puppies might look. The application will store classification results and generated images in a database for future reference, making it a valuable tool for dog breeders, pet owners, and researchers interested in canine genetics.

Despite its promising capabilities, KYON has certain limitations. The system's accuracy depends on the quality of input images, meaning unclear or poorly lit photos may lead to incorrect results. Additionally, its breed classification is restricted to the breeds included in the training dataset, making it less effective for rare or mixed breeds. The offspring prediction feature is based purely on visual traits and does not consider genetic factors that may influence a dog's appearance or health. Furthermore, while the system can identify physical characteristics, it does not provide insights into behavioral traits or hereditary diseases. Since KYON may require an internet connection for complex processing, its functionality could be limited in offline environments. Lastly, the generated offspring images are based on mathematical models and do not guarantee real-world accuracy, making expert consultation still essential for responsible breeding decisions.

Objectives of the Study

This study aimed to use Computer Vision in classifying a specific breed of a dog through video or a live feed input and used image processing to generate the possible appearance of an offspring between two dogs through the morphing of captured images.

The specific objectives of this study were:

1. To create a mobile application that can detect and classify its dog breed using CNNs with an option to generate possible offspring using Delaunay Triangulation.
2. To train a model that classifies dog breeds using a pre-trained model called MobileNet.
3. To create a function that takes two images of dogs and morphs them into a single image using Delaunay Triangulation and warpAffine.
4. To create a database that stores the data of generated offspring for further evaluation.
5. To test and evaluate the project.

Expected Outputs

The "KYON: Dog Breed Classifier and Offspring Generator Using Computer Vision" system is envisioned to deliver two principal outputs. Firstly, the Dog Breed Classifier would analyze images of dogs, leveraging advanced computer vision algorithms to accurately identify and report the breed of each dog by recognizing distinctive patterns and features. This component would likely provide users with a confidence score reflecting the accuracy of each identification. Secondly, the Offspring Generator feature would accept images of two parent dogs and employ generative algorithms to predict and visualize the appearance of potential future offspring. This aspect of the system would synthesize inherited traits from both parents to create a visual representation of the puppies. The overall system is expected to offer an intuitive interface, producing detailed breed reports and offering interactive visual predictions, thus serving as a valuable tool for breeders, researchers, and dog enthusiasts interested in genetics and breed characteristics.

References

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