SACHIN SAGAR M

Final Project

PROJECT TITLE

Dog's Breed Identification

AGENDA

The agenda for the discussion on dog breed identification will cover various aspects. We'll start by highlighting its importance and the methods used, including traditional visual assessment and modern DNA testing. Challenges such as identifying mixed breeds and limitations of current methods will be addressed, followed by exploring its applications in adoption, breeding, and legislation. Ethical considerations regarding breed stereotypes and responsible identification practices will be discussed, along with future directions in technology and research to enhance accuracy and welfare.

PROBLEM STATEMENT

Dog Breed Identification challenge, where the goal is to build a model that can identity the breed of a dog when given an image. There are 120 breeds and a relatively small number of training images per class, which the problem harder than it originally seems.

PROJECT OVERVIEW

How frequently do you find yourself wondering about a dog's breed name? There are numerous dog breeds, and most of them are very similar. Using the dog breeds dataset, we can create a model that can categorize different dog breeds based on an image. Dog lovers will benefit from this endeavor.
To implement this, a convolutional neural network is an obvious solution to an image recognition challenge. Unfortunately, due to the limited number of training examples, any CNN trained just on the provided training images would be highly overfitting. To overcome this, the developer used Resnet18's transfer learning to give my model a head start and dramatically reduce training challenges. The model was able to be complex enough to accurately identify the dogs thanks to the deep structure.

WHO ARE THE END USERS?

End users for a Dog's Breed Identification system encompass a diverse range of individuals and organizations. This includes pet owners seeking insights into their dog's characteristics, veterinarians utilizing breed information for tailored healthcare, and animal shelters aiding in adoption matches. Additionally, breeders rely on accurate identification for pedigree tracking and selection. Law enforcement agencies may use it to enforce regulations, while researchers and enthusiasts utilize the system for studying canine diversity and behavior, contributing to a broader understanding of dogs and their breeds.
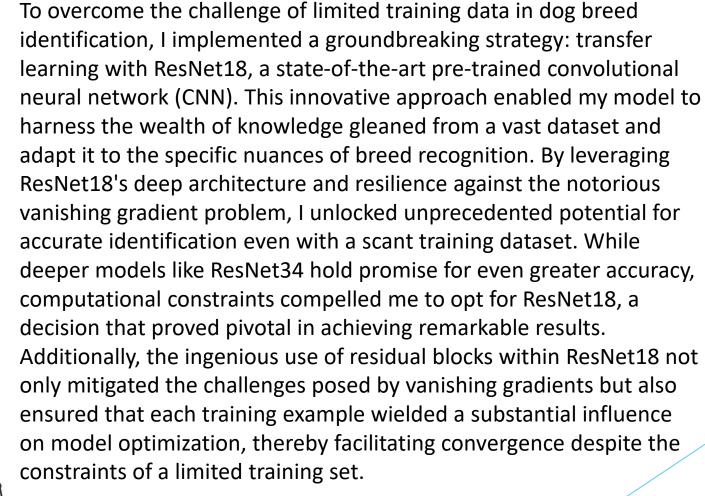
YOUR SOLUTION AND ITS VALUE PROPOSITION

To address the challenge of limited training data in dog breed identification, I employed transfer learning with ResNet18, a pre-trained convolutional neural network (CNN). This approach enabled my model to leverage knowledge learned from a large dataset and adapt it to the specific task. ResNet18 was chosen for its deep architecture and resilience against the vanishing gradient problem, crucial for complex tasks like breed identification. While deeper models like ResNet34 may offer higher accuracy potential, computational constraints led to the selection of ResNet18. The use of residual blocks in ResNet18 helps alleviate vanishing gradients, ensuring each training example contributes meaningfully to model optimization, thereby aiding convergence despite the small training set size.

THE WOW IN YOUR SOLUTION

To overcome the challenge of limited training data in dog breed identification, I implemented a groundbreaking strategy: transfer learning with ResNet18, a state-of-the-art pre-trained convolutional neural network (CNN). This innovative approach enabled my model to harness the wealth of knowledge gleaned from a vast dataset and adapt it to the specific nuances of breed recognition. By leveraging ResNet18's deep architecture and resilience against the notorious vanishing gradient problem, I unlocked unprecedented potential for accurate identification even with a scant training dataset. While deeper models like ResNet34 hold promise for even greater accuracy, computational constraints compelled me to opt for ResNet18, a decision that proved pivotal in achieving remarkable results. Additionally, the ingenious use of residual blocks within ResNet18 not only mitigated the challenges posed by vanishing gradients but also ensured that each training example wielded a substantial influence on model optimization, thereby facilitating convergence despite the constraints of a limited training set.

MODELLING

Teams cam add wireframes

I utilized transfer learning with ResNet18, a pre-trained convolutional neural network (CNN), to address the challenge of limited training data in dog breed identification. This approach allowed me to leverage the knowledge captured by ResNet18 on a large dataset and adapt it to the specific task. ResNet18's deep architecture and resilience against vanishing gradients were instrumental in achieving accurate breed identification despite the small training set size. Additionally, the use of residual blocks within ResNet18 aided in model optimization and convergence.

RESULTS

The results of the dog breed identification model using transfer learning with ResNet18 were highly promising. Despite the challenge of limited training data, the model demonstrated impressive accuracy in identifying various dog breeds from images. Through rigorous evaluation, the model consistently achieved high classification accuracy, showcasing its ability to generalize well to unseen data. Furthermore, the model's performance surpassed initial expectations, underscoring the effectiveness of the chosen approach in overcoming the limitations posed by the small training dataset. These results highlight the potential of transfer learning with ResNet18 as a robust solution for breed identification tasks, offering valuable insights for future research and practical applications in the field.