**A Deep Learning Approach to Fine-grained Dog Breed Classification**

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**Abstract**

e.g., Write the abstract in 200 words here. An abstract is a concise paragraph that summarizes the problem, method and conclusions of the article.

…………………………………Note: replace the red text with black text.

**1. Introduction**

**1.1. Problem Specification/Project Description**

This project aims to make a solution that makes it easier for the public to identify the specific sub breeds or mixes of breeds within their dogs. This would help them have a better awareness of any breed specific health issues their dog may face.

**1.2. Significance**

Many breeds of dogs have specific health issues that become very prominent as they reach old age. Being able to determine the sub breeds of a mixed breed dog would help dog owners understand the possible health issues their dog may face in their old age. This would allow them to take preventative action and improve their dog’s quality of life.

Similarly breed recognition could help with training by helping determine a dogs interaction behavior and inherent instincts. These behaviors and instincts are heavily linked to a dog’s genetics.

**2. Related Works**

**2.1. Review Several Research Works in Most Recent Years**

Several other deep learning approaches to fine-grained breed classification have been done previously. A paper, published in December of 2020 written by Ding-Nan Zou, Song-Hai Zhang, Tai-Jiang Mu, and Min Zhang, discussed the creation of a dataset to train several pre-existing models, Inception B3, WS-DAN, PMG & TBMSL-Net (4 classification deep neural networks) [1]. A paper written by Xavier Higa in April of 2019 discusses the use of two different CNN’s, (VGG-16 & Densenet-201) trained on the Stanford Dogs dataset, to determine a specific breed for a dog [2]. Kaitlyn Mulligan and Pablo Rivas published a paper in 2019 about breed identification using the Xception neural network (a CNN) [3].

**2.1. The Most Similar Research Paper**

Note: In this section, from the above related works you will pick one research paper which is most similar to your project topic. You need to introduce its idea, method and experimental results using text, figures, tables.

e.g., The most related research work is the research paper <……> by research David Jonathon. It’s idea…..

**3. Tasks or/and Preliminary Idea**

e.g., In this project, we will compare the performance of the state-of-the-art methods about XXX problem. Also, we will implement an improved or new method about….. The preliminary idea behind method is ………. The pipeline of the method is shown in Figure 1.

A picture containing clock

Description automatically generated

Figure 1. Pipeline of the method.

**4. Data Acquisition**

e.g., We will collect XXX dataset for this project. This data can be obtained from ……….. We will preprocess this data for ……..

**5. Project Timeline**

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| --- | --- | --- |
| Task | Time | Weeks |
| 1. Find and read related research papers and write our research proposal. | 9/1 - 9/16 | >2 |
| 2. Prepare and obtain our project’s dataset | 9/16 - 9/19 | <1 |
| 3. Implement existing models from research papers and compare their performance | 9/19 - 10/3 | 2 |
| 4. Implement changes to best existing model to allow multi-breed classification | 10/3 - 10/18 | 2 |
| 5. Prepare Midterm Project Progress Report | 10/18 - 10/24 | 1 |
| 5. Conduct experiments to compare different models using multi-breed classification | 10/24 - 11/8 | 2 |
| 6. Write project report paper | 11/8 - 11/22 | 2 |
| 7. Prepare our complete final submission for the class project | 11/22 - 11/28 | 1 |

**References**

1. Zou, DN., Zhang, SH., Mu, TJ. et al. A new dataset of dog breed images and a benchmark for finegrained classification. Comp. Visual Media 6, 477–487 (2020). <https://doi.org/10.1007/s41095-020-0184-6>
2. Higa, Xavier. Dog Breed Classification Using Convolutional Neural Networks: Interpreted Through a Lockean Perspective. Diss. Lake Forest College, 2019. https://core.ac.uk/download/pdf/214315107.pdf
3. Mulligan, Kaitlyn, and Pablo Rivas. "Dog breed identification with a neural network over learned representations from the xception cnn architecture." 21st International conference on artificial intelligence (ICAI 2019). 2019. https://www.reev.us/pdfs/mulligan2019dog.pdf