NITTE EDUCATION TRUST | N.M.A.M. INSTITUTE OF TECHNOLOGY
(An Autonomous Institution affiliated to Visvesvaraya Technological University, Belagavi)
Nitte – 574 110, Karnataka, India
(ISO 9001:2015 Certified), Accredited with 'A' Grade by NAAC
☎: 08258 - 281039 – 281263, Fax: 08258 – 281265
**Department of Computer Science and Engineering**
B.E. CSE Program Accredited by NBA, New Delhi from 1-7-2018 to 30-6-2021

Report on Mini Project

# K9 FINDER

**Course Code: 18CS601**

**Course Name: MACHINE LEARNING**

Semester: VI SEM Section: D

**Submitted To:**

**Ms. Keerthana B**

Associate Professor Gd-II

Department of Computer Science

And Engineering

**Submitted By:**

Vaibhav (4nm18cs207)
Vinayak (4nm18cs209)

**Date of submission: 15/06/2021**

NITTE EDUCATION TRUST | N.M.A.M. INSTITUTE OF TECHNOLOGY
(An Autonomous Institution affiliated to Visvesvaraya Technological University, Belagavi)
Nitte – 574 110, Karnataka, India

(ISO 9001:2015 Certified), Accredited with 'A' Grade by NAAC
☎: 08258 - 281039 – 281263, Fax: 08258 – 281265

**Department of Computer Science and Engineering**
B.E. CSE Program Accredited by NBA, New Delhi from 1-7-2018 to 30-6-2021

# CERTIFICATE

"K9 Finder" is a bonafide work carried out by Vaibhav (4nm18cs207) and Vinayak (4nm18cs209) in partial fulfilment of the requirements for the award of Bachelor of Engineering Degree in Computer Science and Engineering prescribed by Vishvesvaraya Technological University, Belagavi during the year 2020-2021.

It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report. The Mini project report has been approved as it satisfies the academic requirements in respect of the project work prescribed for the Bachelor of Engineering Degree.

Signature of Guide Signature of HOD

# ACKNOWLEDGEMENT

The satisfactions that accompany the successful completion of any task would be incomplete without the mention of the people who made it possible. So, we acknowledge all those whose guidance and encouragement served as a beacon of light and crowned our efforts with success.

We are thankful to our project guide, Ms Keerthana B, Dept. of CSE for her valuable guidance and advice. Her willingness to motivate us contributed tremendously to our project.

We would like to place on record our deep sense of gratitude to Dr. K. R. Udaya Kumar Reddy, HOD-Dept. of Computer Science and Engineering, NMAMIT, Nitte for his generous guidance, help and useful suggestions. We also acknowledge and express our sincere thanks to our beloved Dr. Niranjan. N. Chiplunkar, Principal, NMAMIT, Nitte who is a source of inspiration to us.

We thank all the Teaching and Non-Teaching staff members of the department of CSE for providing resources for the completion of the project. Special thanks go to our parents, friends and relatives for supporting and encouraging us in all ways thus making our project successful. Finally, we thank all those who have contributed directly or indirectly in making this project a grand success.

Vaibhav
(4nm18cs207)

Vinayak
(4nm18cs209)

# ABSTRACT

There are around 120+ dog breeds in the world, and identifying each one is a difficult task. A typical human may only be familiar with a few breeds, such as the German shepherd and the pug. So we employ computer vision and machine learning techniques to predict dog breeds from photos to make this task easier. We use image classification techniques based on deep neural network architecture to determine the breed, and we created a web-based application to make it easier for a common person to use.

# Table of Contents

# INTRODUCTION

Dog is a domestic mammal belonging to the Canidae family. One of the two most common and popular domestic animals on the planet is the dog. It has been a hunting companion, guardian, object of derision or affection, and friend to humans for over 12,000 years.

Dogs come in a variety of sizes and forms. It's hard to believe that a massive Great Dane and a little poodle belong to the same species, but they're genetically identical and have similar anatomical traits.

In many places of the world, dogs are treated differently. Dogs have an essential place in the world because of their characteristics of loyalty, friendship, protectiveness, and affection. Breed-typical personalities have emerged as a result of generations of selection for specific characteristics. The ability of dogs to adjust to new environments or owners is also influenced by breed specificity.

The bond between people and dogs is not a recent development. In today's society, however, most dogs are kept as pets. However, remembering and identifying all of a dog's breeds is quite difficult for the typical human. These issues inspired us to create a web based application that allows any user to identify a dog's breed simply by uploading a photograph in the application.

# LITERATURE SURVEY

The current section presents previous attempts at addressing the problems tackled by the current research. Liu et al. present alternative learning methods in 2016 using attention localization, while Howard et al. in 2017 present a learning of a CNN using the Mobile Net architecture and the Stanford Dogs dataset extended with noisy data.

Similar fine-grained image recognition problems are solved by detection. For example, Zhang et al. generalize RCNN to detect different parts of an image, while Duan et al. discover localized attributes. Angelova et al. use segmentation and object detection to tackle the same issue. Chen et al. use selective pooling vector for fine-grained image recognition.

The paper "Image Net Classification with Deep Convolutional Neural Networks" presents a multi-class classification problem involving fine-grained image recognition, namely determining the breed of a dog in a given image. Convolutional neural networks, among other deep learning methods, are used in the presented system. On the Stanford Dogs dataset, two different networks are trained and evaluated.

In this paper a convolutional neural network is used to find dog facial keypoints for each image. The keypoints are then used to extract features. A comparison is made from a number of classification algorithms that use these features to predict the breed of the dog in the image. The best classifier is an SVM with a linear kernel, which correctly predicts the correct dog breed 52 percent of the time on its first guess; 90 percent of the time, the correct dog breed is among the top 10 predictions.

# DESIGN AND IMPLEMNTATION

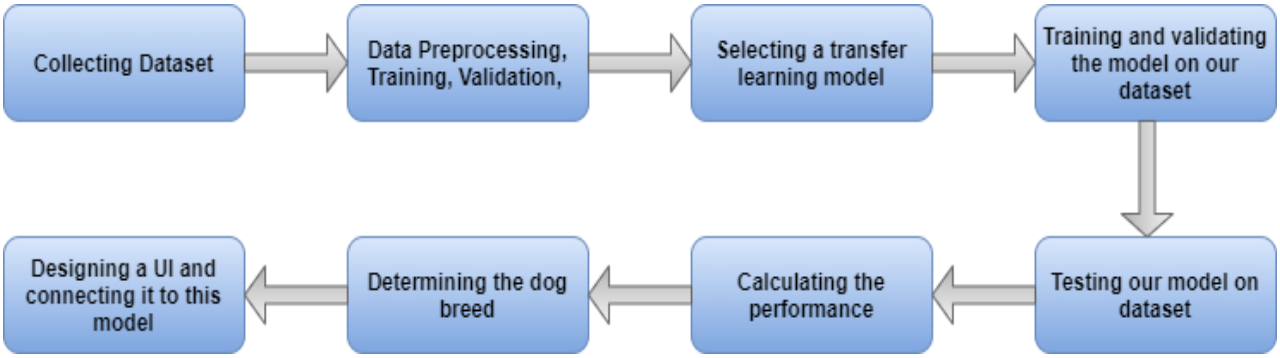


**Figure 1: Activity Diagram**

### Collecting Dataset:

We used the kaggle.com dog breed identification dataset for this research. This dataset contains a training set of 10.2K photos and a test set of 10.4K photos of dogs. Each image has a filename that serves as a unique identifier. There are 120 breeds in the dataset.

### Data Pre-processing, Training, Validation:

Image data augmentation is a technique for artificially increasing the size of a training dataset by modifying photographs in the dataset. To improve the model's performance and generalisation ability, image data augmentation is employed to enhance the training dataset.

More data can help deep learning neural network models become more skilled, and augmentation approaches can help fit models generalise what they've learnt to new images by creating modifications of the images.

The ImageDataGenerator class in the Keras deep learning neural network toolkit allows you to fit models with image data.

**Selecting a Transfer learning model:**

In this step, we choose the model on which we wish to do the transfer learning. Keras has a lot of choices for this. Smaller models are usually faster but less precise, while larger models are slower but more accurate. MobileNet is now the fastest, while NASNetLarge is the most accurate. We set include_top=False, hence the output of the previous layer is passed through a GlobalAvreagePooling2D() that extract most important features. With the training and validation data, the model is now trained. We also specify the image dimensions (331,331) and batch size (32); the Keras generator will use bilinear interpolation to automatically resize all loaded images to target size.

**Training the model:**

With training data and validation data, the model is now ready to be trained. The model will be tested against the validation dataset as it is being trained. This aids in determining the model's correctness. For a total of 25 epochs, we trained the model (we use early stopping wit patience 2, hence it stops at epoch 17). Following the training, we have an accuracy of 94.12% and a loss of 0.262.

**Testing our model:**

We test the model on the validation data after it has been trained. The model returns 120 values in an array for each image of the test data. We use the argmax of the expected value to convert these values to whole numbers.

**Calculating the performance:**

Different performance metrics, such as the confusion matrix, accuracy, and precision, can be used to calculate the model's performance. On the test data, we used accuracy and got a score of 94.12%.

**Determining the breed:**

As its expected values are whole numbers, we use the labels to identify the breed. We can use this to predict the dog's breed. Along with this we also specify the lifespan of the dog.

**Designing the UI and linking it to the model:**

HTML and CSS were used to create the user interface. The flask framework was used to connect the user interface to the model. As input, a picture of the dog whose breed is to be predicted is provided. Following the prediction, the breed and lifespan of the dog are displayed.

# RESULTS

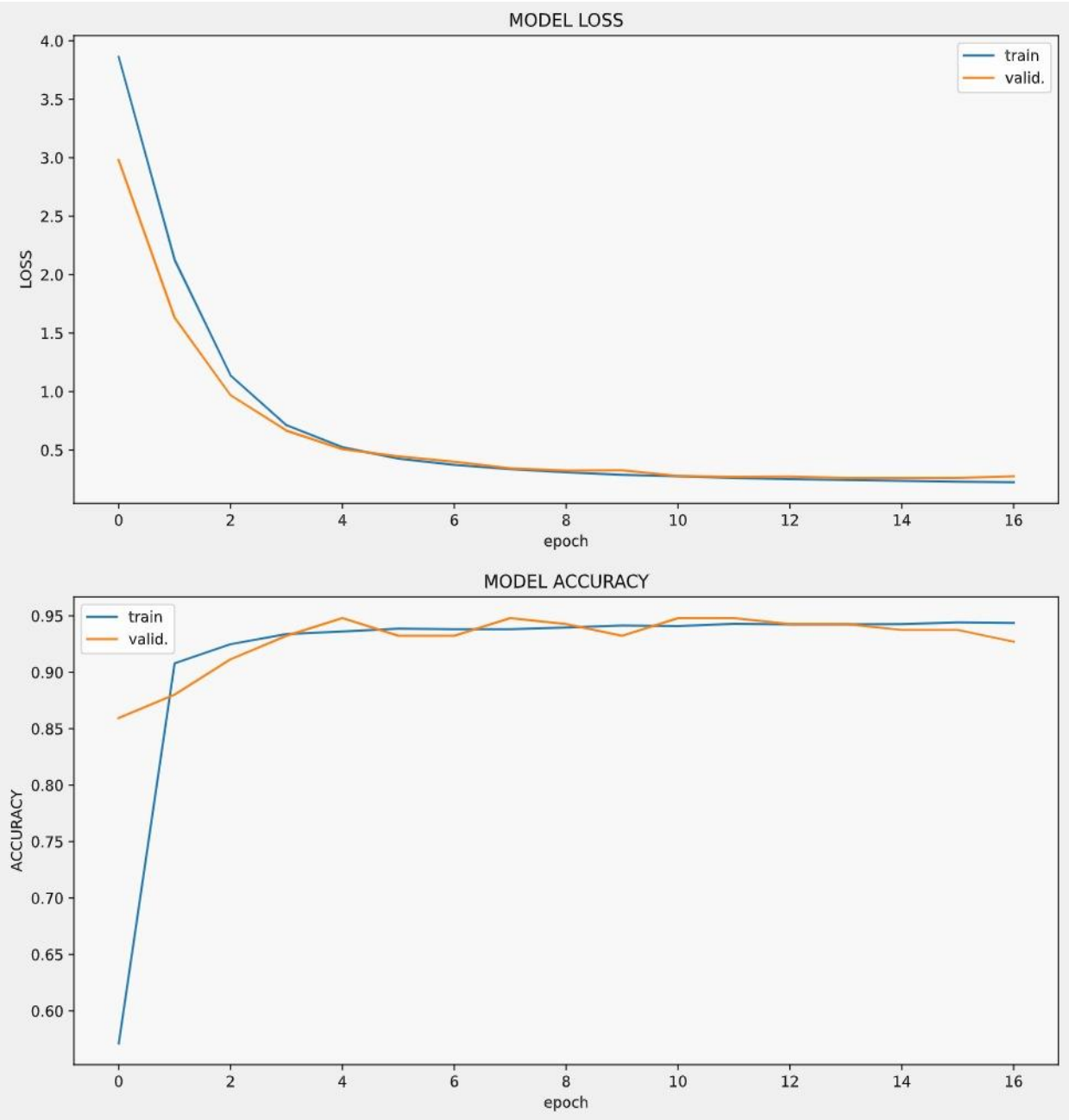


**Figure 2: Accuracy graph**

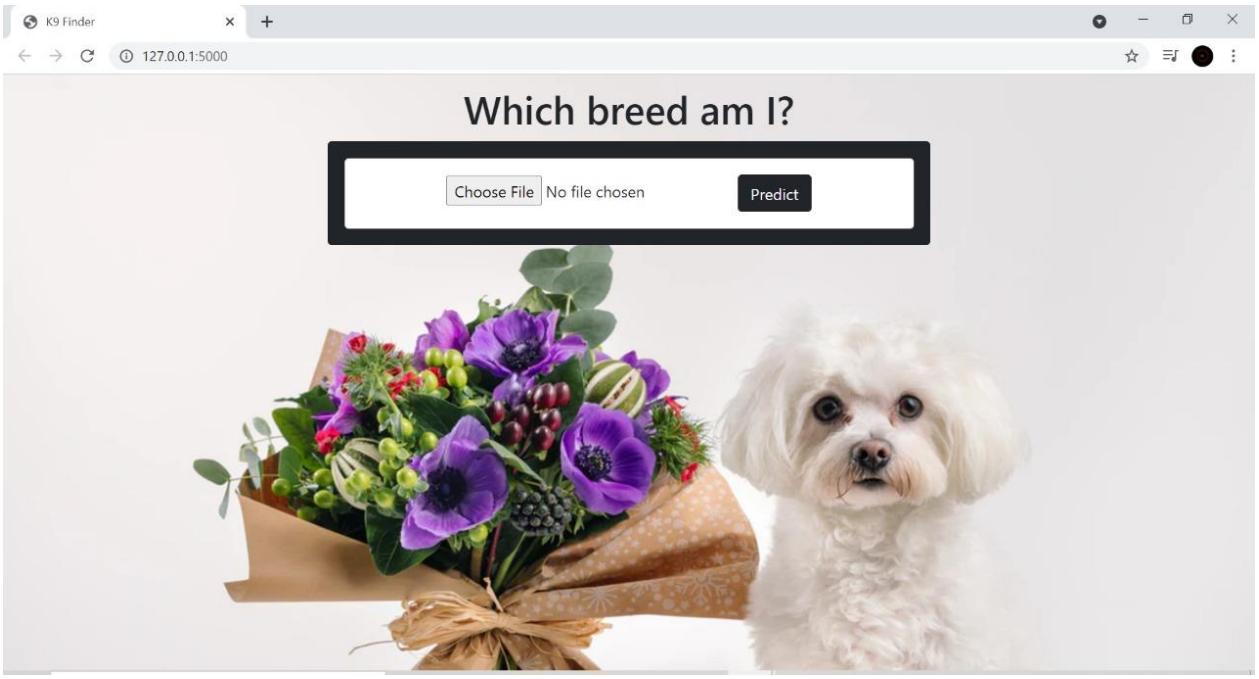


**Figure 3: Front Page**

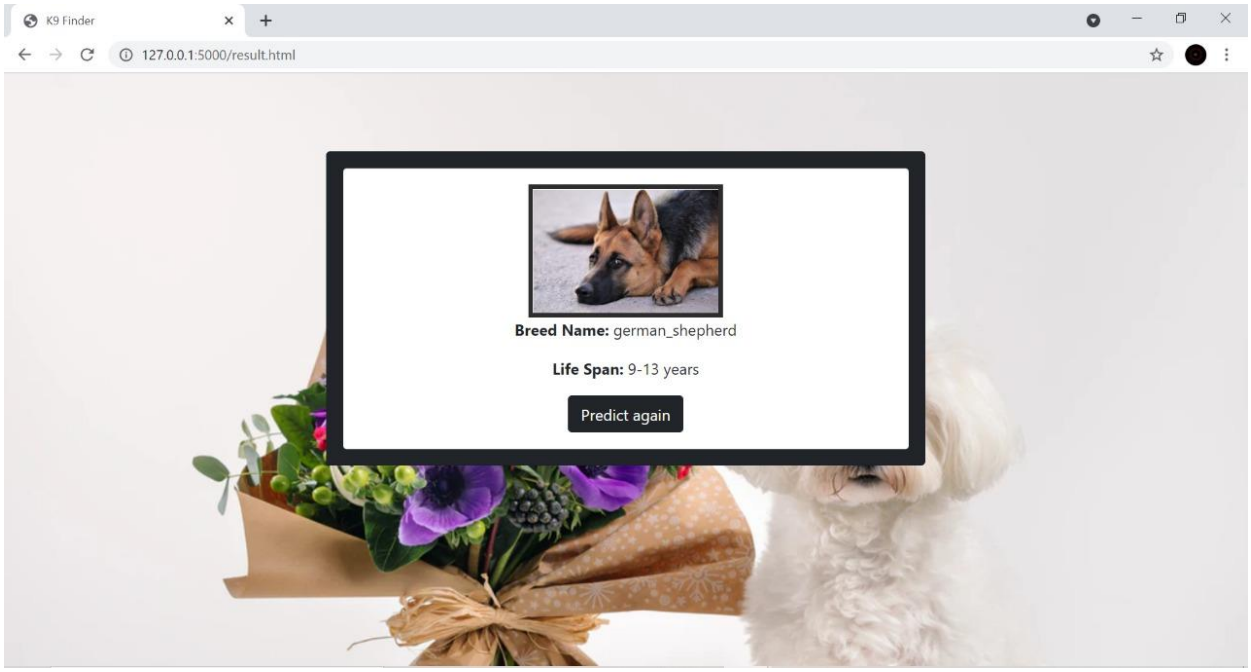


**Figure 4: Result Page**

# Conclusion

Given the large number of breeds involved in this fine-grained categorization task, we believe our results to be a success. Given the high heterogeneity both between and within the 120 different breeds in the dataset, we are able to accurately identify the proper breed the vast majority of the time, a performance that few humans could match.

# REFERENCES


- https://www.kaggle.com/c/dog-breed-identification
- https://getbootstrap.com/docs/4.0/getting-started/introduction/
- https://towardsdatascience.com/
- https://www.tutorialspoint.com/index.htm