



Dogs and Their *Behaviours*

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*How is
this dog
feeling?*





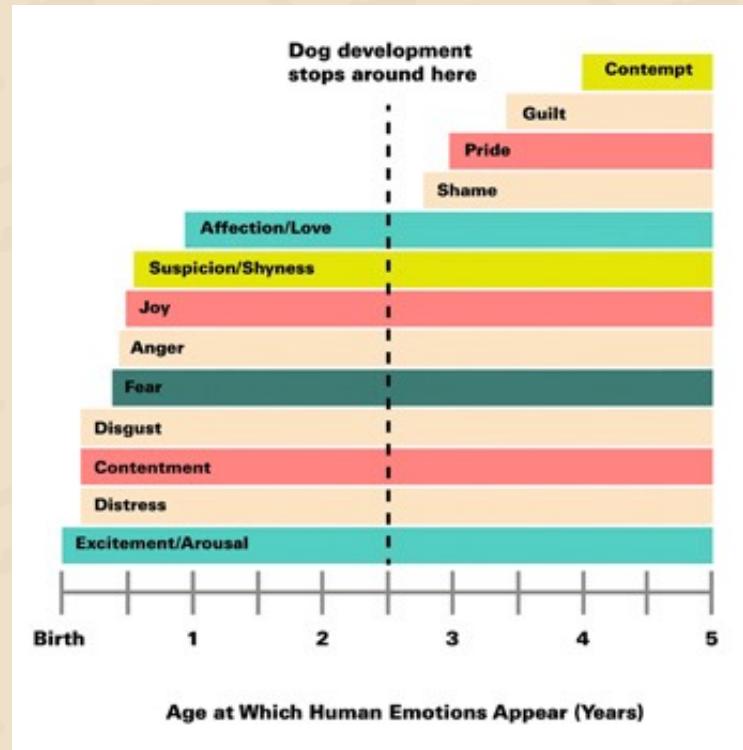
Pug is showing the basic emotion of fear instead of what we think is guilt

*He is feeling
fearful*

Dogs do not
experience *guilt*



Emotions of Dog = Human's Emotions up till 2.5 years old



<https://moderndogmagazine.com/articles/which-emotions-do-dogs-actually-experience/32883>



Why Study Dogs Behaviour?

- **Dogs communicate their feelings through their body language**
- First and most important step to **build a strong and healthy relationship with your dog** is to understand how it thinks, feels, and learns.
- Understanding your dog and gaining insights into how its mind works can truly make you a **better pet parent and companion to it.**



Project Objective



“How can we *help new dog owners* understand their dog’s overall emotions to foster healthy development of dogs? ”



Project Objective



1. Understand the key emotions of dogs



2. Explore data and gain insights



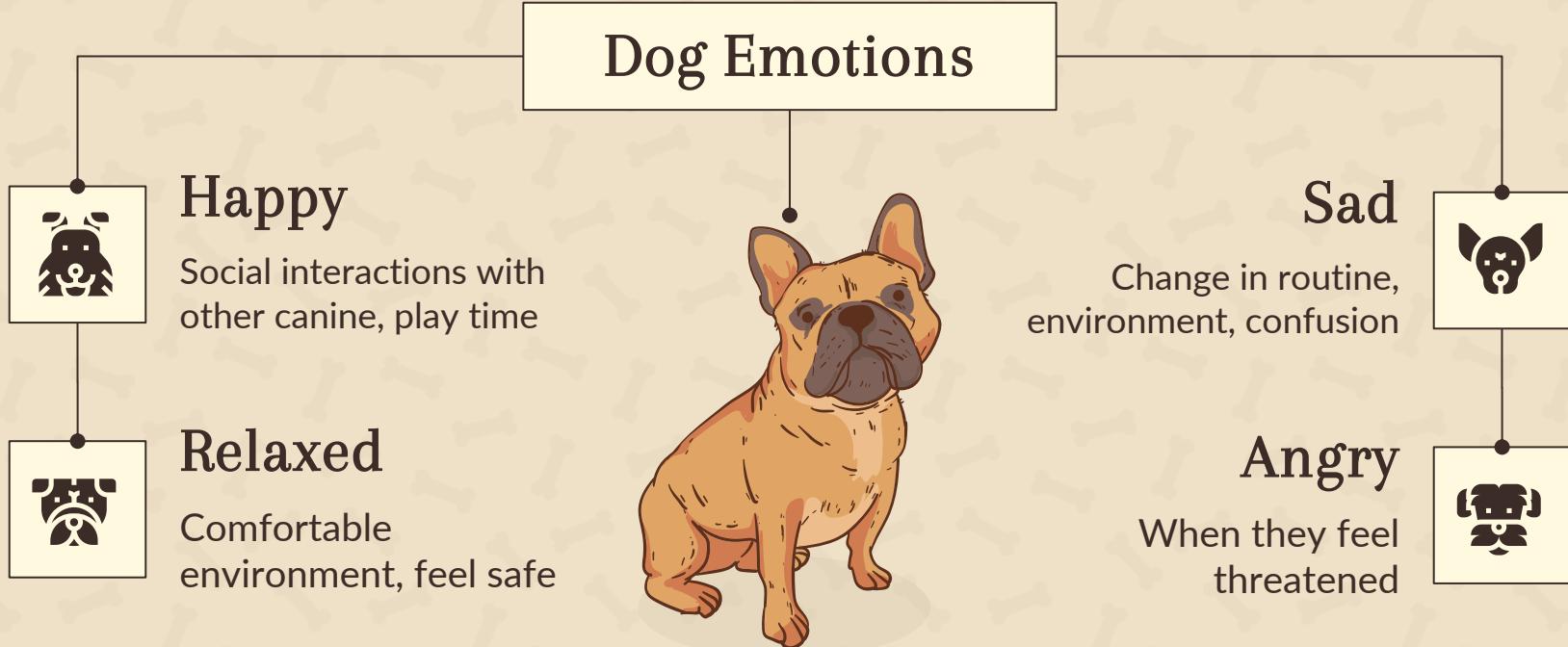
3. Create a predictive model to predict dog emotions through their behaviour



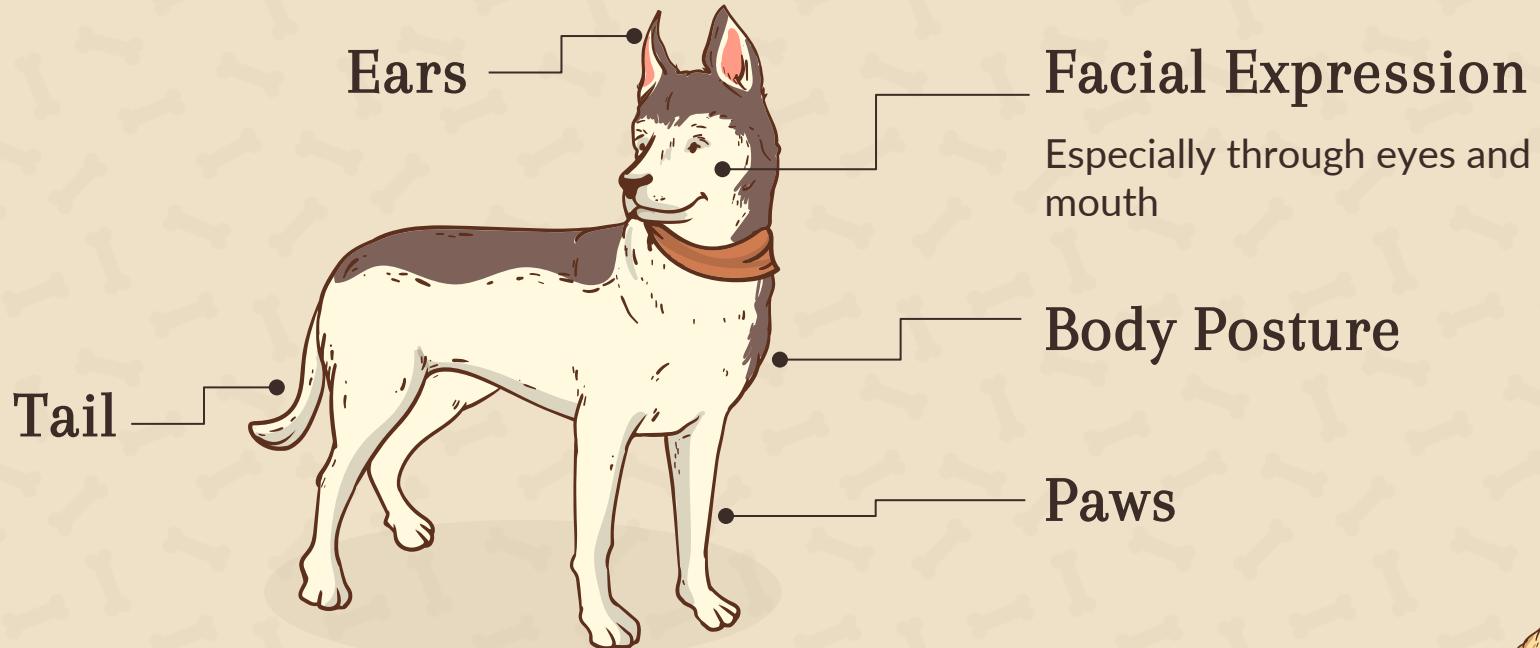
4. Deploying a web application for new pet owners



Key Emotions of Dog



Dogs Communicate with Body Language



Data Analysis – Happy with Tongues Out

Soft, open mouth that kind of looks like a dog version of a smile



<https://www.pethub.com/articles/259461/what-is-your-pet-trying-to-tell-you-reading-your-dog-s-body-language>

Data Analysis – Happy with Tongues Out

Some breeds may look fierce but they are happy



Data Analysis – Relaxed in Posture

Loose shoulders, soft squinty gaze, and body curved in 'C' shape are all clues that your dog's feeling super chill



Data Analysis – Relaxed with Cross Paws

Dogs crossing their paws are relaxed even though we might not observe from their facial expressions



Data Analysis – Relaxed with Paws Spread Out

They may look sad but they are relaxed when body/paws is spread out widely



<https://www.pdsa.org.uk/pet-help-and-advice/looking-after-your-pet/puppies-dogs/canine-body-language>



Data Analysis – Sad with Body Appear Smaller

Paws are hidden and body is not as wide-spread

They might look bored but in real fact, when they are bored, they will find things to do.



Data Analysis – Sad with Head Low

Hold their head low and avoid eye contact – this is not guilty face because they don't have the capacity to feel guilt



Data Analysis – Angry with Eyes Narrow

Eyes are usually narrow and appear smaller than normal, almost as if they are squinting



<https://www.pethub.com/articles/259461/what-is-your-pet-trying-to-tell-you-reading-your-dog-s-body-language>



Data Analysis – Angry with Teeth shown

Lips pulled back and is bearing their teeth. If you notice that their face is in this position and their top and bottom teeth are separated, this is an indication the dog is ready to bite.





“Will new pet owners be able to remember consciously these behaviours and the underlying emotions?”



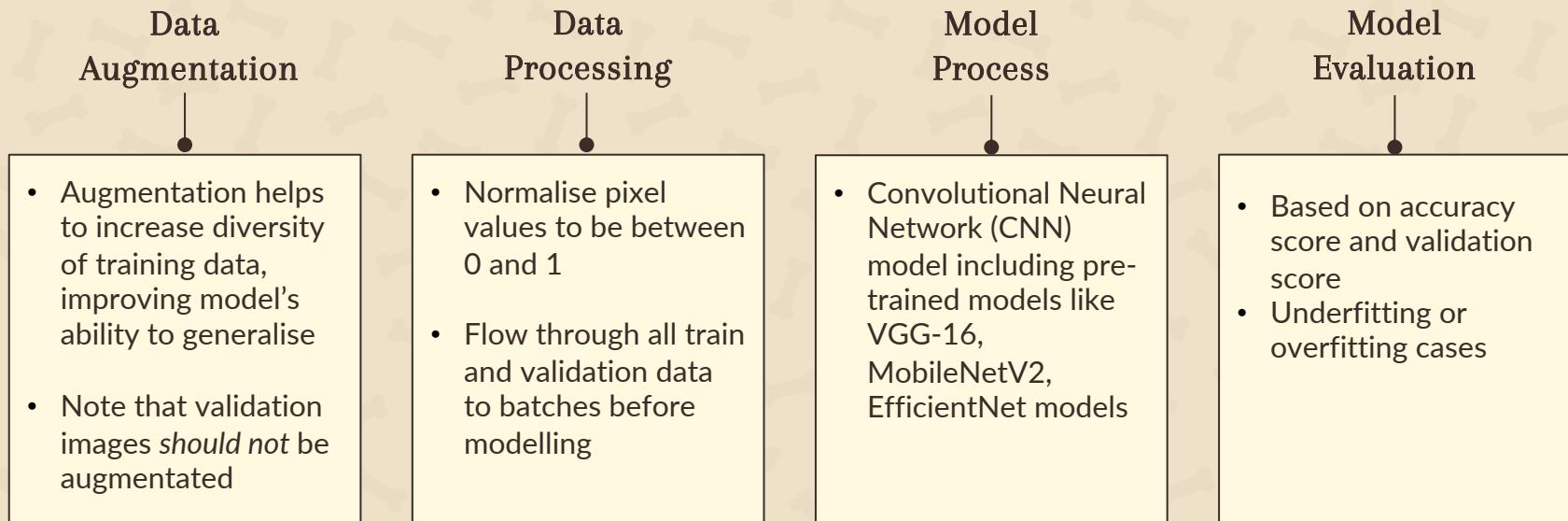
Dog Behaviour Predictor Application



To *help new dog owners*
identify their dog's overall
emotions easily.



Predictive Model Process



- CNN is a type of network architecture for deep learning algorithms and is specifically used for image recognition and tasks that involve the processing of pixel data.

- Pre-trained CNN models were trained on the ImageNet dataset which consists of over a million training images with 50,000 for validation.



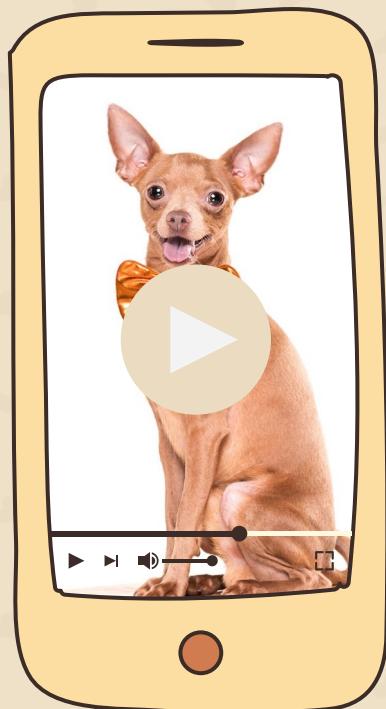
Best Model - EfficientNet

4 classes:
Happy/Relaxed/ Sad/Angry



Model	Accuracy Score	Validation Score	Time Taken
Baseline CNN model	0.999	0.322	6,578 sec
VGG-16 model	0.990	0.568	66,131 secs
MobileNetV2 model	0.998	0.552	3,759 secs
EfficientNet model	0.997	0.589	7,478 secs

Deployment Model - EfficientNet



Deploy 2 classes
- Sad and Relaxed

Model	Accuracy Score	Validation Score	Time Taken
EfficientNet model	0.999	0.850	4,855 secs

Foster Healthy Development of Dogs



Social Interactions

- Set up a doggy playdate with another canine friend



Play

- Exercise & playtime like fetch, brisk walk, toys
- Positive reinforcement helps to reinforce good behaviour



Safe space

- Provide a comfortable environment, cozy bed and soft toys



Training

- If your dog is showing signs of aggression frequently, consult a professional dog trainer

SUMMARY

Problem Statement

- “How can we *help new dog owners* understand their dog’s overall emotions to foster healthy development of dogs?”

Creating web application for new pet owners

- Allows pet owners to understand their dog behaviours easily and encourage little habits that can help to improve a dog’s well-being in the long term.

Future Work

- Include other emotions that could be harder for new pet owners to differentiate such as fear and distress.

