Tailsense: Classifying Dogs' Emotions Using Barks and Images Based on Breed

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Purpose Dog barks and visual cues are main channels through which dogs communicate their emotional states, such as anger, sadness, and excitement. However, accurately interpreting these is a challenge for humans, needing advanced technological solutions for understanding canine emotions. This study presents a real-time prototype system designed to classify canine emotional states by leveraging a multi-modal approach using audio and image data. Procedure This methodology outlines a systematic approach to developing the TailSense system, leveraging ResNet152 & EfficientNet for dual-modality canine emotion classification. Each step is designed to ensure data quality, model accuracy, and practical deployment, combining in a tool for understanding canine emotional states. The integration of advanced deep learning techniques shows the projects innovation. Built on a Raspberry Pi 5 equipped with an HD camera, a microphone and a 5 inch TFT display, the system is able to take both audio and image input. Results The experimental evaluation showed that the dual-modality TailSense system achieved a validation accuracy of around 90%. The ResNet152 & EfficientNet-based image classifier produced consistent results with a confusion matrix with balanced performance across all emotion categories. Similarly, the spectrogram-based audio classifier had similar accuracy, strengthening the efficiency of the multimodal approach. Conclusion The proposed TailSense system leverages deep ResNet152 & EfficientNet architectures for multimodal emotion classification, achieving an accuracy of approximately 90%. These findings show the potential of deep learning in pet behavioral analysis and lay the groundwork for future research aimed at optimizing this method for further accuracy.

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