SMART DOG COLLAR

Helping dog owners keep their epileptic dogs safe and healthy

OWNERS OF EPILEPTIC DOGS NEED TO KNOW WHEN A SEIZURE OCCURS

- Whether going out for groceries or spending the day at the office, owners of epileptic dogs may be away from their beloved pets for hours at a time. While away, their dog might have a seizure and require medical attention, all while their are not available to help. We envision a technological solution that automatically notifies owners when a seizure occurs.
- Our project partner, Patrick Donnelly, developed this idea after an unfortunate event where his dog, Mabel, suffered a cluster-seizure event. While he was at work, Mabel suffered an extended seizure for several hours. As a result of this extended event, she needed immediate transportation to a veterinary hospital for emergency medical treatment.



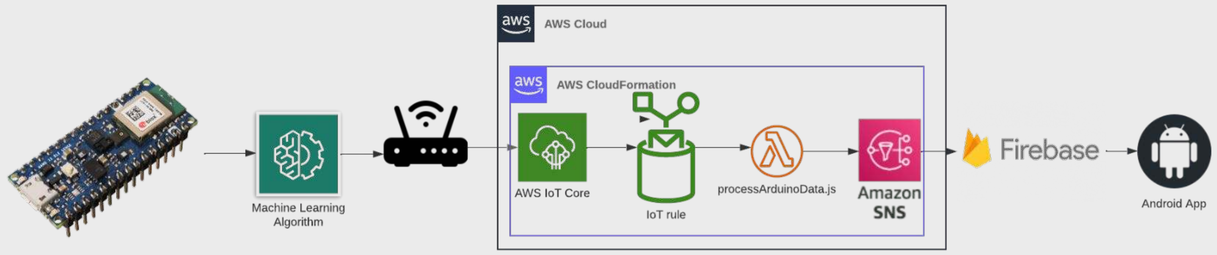

Figure 1: Data Pipeline

ARCHITECTURE TO SEND WARNINGS TO USERS

- This device is designed to detect seizures and send urgent and timely push notifications. Physically, the device sits within a collar/harness that the dog wears. This harness contains sensors and electronics that monitor the dog's behavior and recognize the motions indicative of a seizure.
- The harness uses the Arduino Nano 33 BLE Sense to make these detections. The onboard gyroscope, accelerometer, and machine-learning hardware meshes well with our application. Additionally, an ESP32 WiFi microcontroller connects the device to the owner's local WiFi and subsequently our AWS Cloud services.

SUMMARY AND NEXT STEPS

- Recollecting data is a crucial step since the current training data is for a different microcontroller. This causes the on-board classifications to be inaccurate due to the discrepancies of data.
- Developing the current machine learning algorithm will be another huge step for activity classification. It currently uses a basic dense neural network which limits the potential accuracy this model can have.
- Expanding model inputs will greatly increase the accuracy of our model. It only uses acceleration and rotational velocity. Inputs such as heartbeat may help the models better understand how seizures affect dogs.

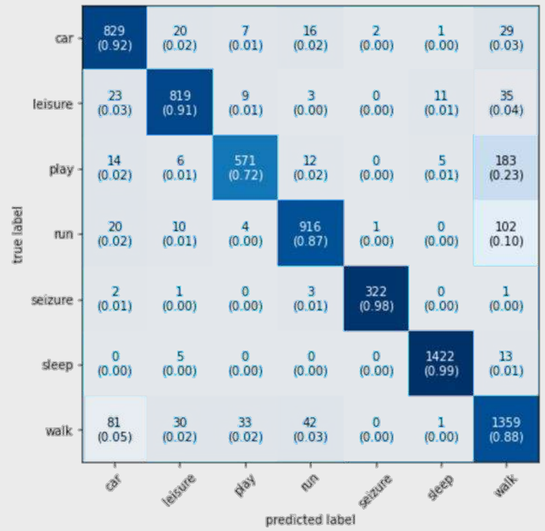

Figure 2: Machine Learning Model Confusion Matrix

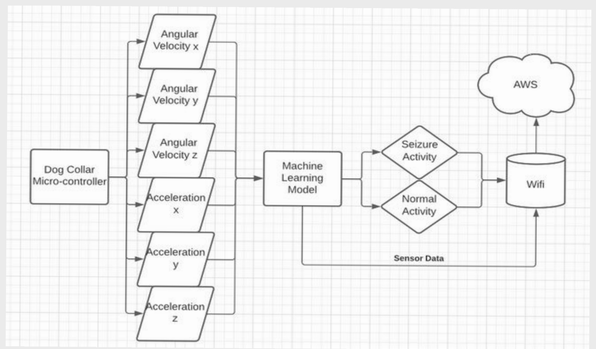

Figure 3: Smart Dog Collar Machine Learning Diagram

ACKNOWLEDGEMENTS

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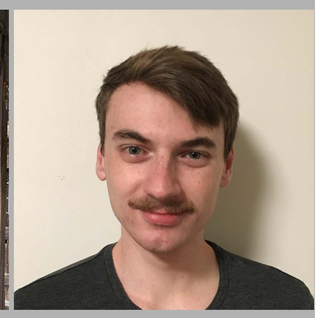

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