UNIVERSIDAD POLITÉCNICA DE YUCATÁN

BIS Universities

Universidad Politécnica de Yucatán

Computational Robotics

Engineering

Project Proposal

Robotics 9B

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Description of the Problem:

On October 2 of this year, the beloved mascot of the Universidad Politécnica de Yucatán, Gupy the cat, was found with a serious injury. These events caused him to be sent to a veterinarian for treatment and left the UPY community shocked.

The article "Spouses and Cats and Their Effects on Human Mood," authored by Dennis C. Turner, Gerulf Rieger, and Lorenz Gygax in 2003, indicates that individuals who own cats tend to experience fewer instances of bad moods compared to those who do not have feline companions. Moreover, cat owners report lower feelings of seclusion or loneliness. These effects on reducing negative moods appear to be independent of a person's gender.

For these reasons, we intend to generate an intelligent solution that helps keep Gupy safe: a mobile bodyguard robot. This project seeks to implement different types of machine learning to ensure correct operation.**1. Unsupervised Learning for Identifying Characteristics in Cats:**

- Developing an unsupervised learning algorithm for analyzing characteristics in images of cats, including features like ears, tails, face, paws, and more. The goal is to detect, identify, and recognize specific cats, such as Gupy. The process involves collecting a diverse dataset, preprocessing the data, extracting relevant features, clustering similar images, and using these clusters for cat identification. The algorithm can also be refined for recognizing unique traits of individual cats, like Gupy, and has practical applications in pet identification, security systems, and personalized pet experiences.

2. Supervised Learning for Gupy Detection from Images:

- Leveraging the datasets of cats, it is possible to precisely identify Gupy in the environment. Applying supervised learning, an algorithm capable of focusing on Gupy can be developed. It is also possible to identify Gupy's emotions from images by collecting labeled images of Gupy displaying different emotions (e.g., happy, sad, playful) to perform possible future actions.

3. Reinforcement Learning to Train the Robot:

- To ensure Gupy's safety, the project will implement reinforcement learning to train the mobile bodyguard robot. The robot's primary function will be to position itself between Gupy and other moving objects that invade a determined area of Gupy's "personal space."
- The robot will learn various routines and movements to effectively protect Gupy in different situations, adapting its actions based on Gupy's needs and surroundings.

This interdisciplinary approach combines the power of machine learning and robotics to enhance the safety and well-being of Gupy, the beloved mascot of UPY, and potentially improve the lives of other pets and their owners as well.

References:

1. Dennis C. Turner, Gerulf Rieger & Lorenz Gygax (2003) Spouses and cats and their effects on human mood, Anthrozoös, 16:3, 213-228, DOI: 10.2752/089279303786992143