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Human-Machine Hybrid Model to Classify Pill Shapes

Patent Pending **GMU-20-010**

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Description

We have designed a Human Machine Hybrid (HMH) pill shape classification system that uses: 1) An imaging device for generating pill images (camera); 2) A computer system receiving and processing the pill images; 3) A decision tree with algorithm for uniquely identifying pill shape; and 4) An output device providing the users with shape classification of the pill. Our decision tree uses a neural network algorithm to process pill images and extracts pill descriptors using human knowledge. Computer modeling techniques are used to discriminate descriptors for proper pill shape classification.

Problem Addressed

Prescription drug use is on the rise all over the world. Often times patients are given the wrong medication due to poor communication between health care officials. Pill identification remains a challenging problem. A method to identify pills automatically is desirable by law enforcement agencies, the health care industry, and the consumers. The ubiquity of smart phones and affordable, high-quality cameras allows users to take pictures of pills effortlessly. This allows pills to be potentially identified by both medical professionals and consumers. Nurses and medical professionals would be able to verify the administration of pills to patients. Our invention implements a Human-Machine Hybrid (HMH) decision tree with a total of seven interpretable metrics, that classifies pill shapes. This model outperforms all other existing approaches to pill shape classification.

Advantages

- The computer system uses shape metrics such as area to classify pill shapes. Using interpretable metrics helps the analyst understand the model and explain it to other audiences with ease.
- Each node of the decision tree converts the multinomial problems into binary ones. This simplifies the problem for the computer system by breaking down the problem into a series of cleaner ones.
- Law enforcement agencies, medical care firms, and consumers can use this tool to help perform pill identification.

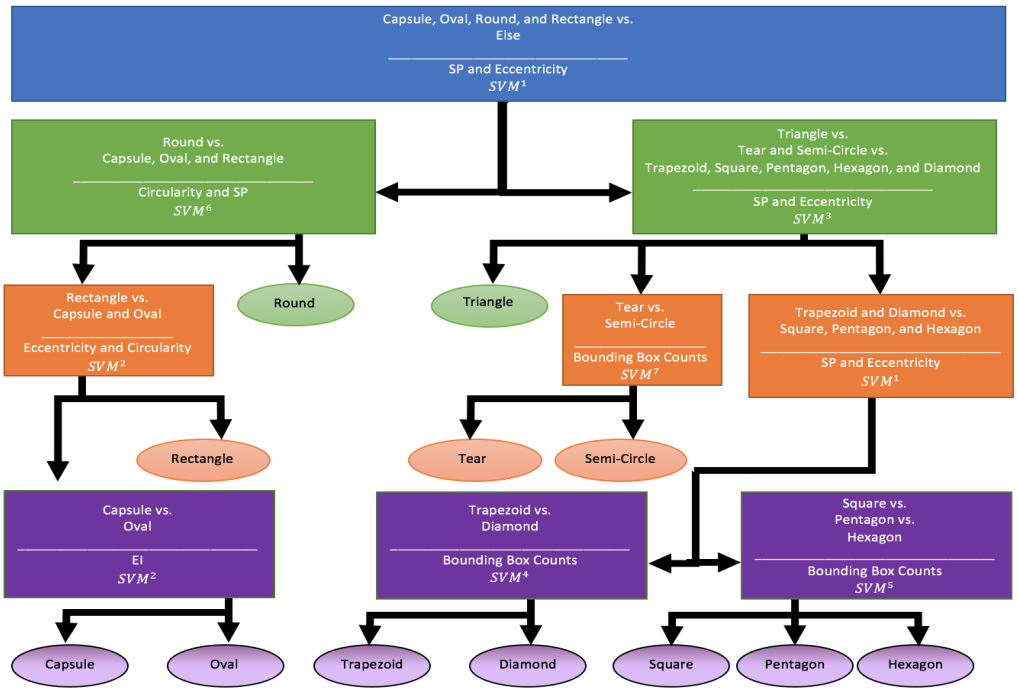

Figure One: Pill classification based on shapes, color.

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