DETICKT IT: A Machine Learning-Based Application for Real-Time Tick Identification and Spatiotemporal Disease Risk Assessment

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There is an alarming increase in the population of ticks and tick-borne diseases (TBDs), with 475,000 cases reported annually, some of which are fatal. Due to limited training, healthcare providers and the public cannot always accurately identify ticks and their associated infections, leading to delayed diagnoses and treatments. Additionally, the prevalence rates of different disease-causing pathogens vary based on geographic locations. To facilitate the identification process and provide an expedited risk assessment of TBDs, a machine learning-based iOS application, DETICKT IT, was created. The app features a ResNet50V2 (transfer learning) deep convolutional neural network built in Python for combining real-time tick-species identification with a novel "window" algorithm and a location-based tick-risk assessment by embedding the Centers for Disease Control and Prevention's spatiotemporal tick and pathogen surveillance statistics. Users can receive an immediate and accurate analysis to determine whether they are at risk of contracting certain TBDs based on their geographic location. The app is able to accurately identify the ten most common tick species in North and South America: American dog tick, Asian Longhorned tick, Brown dog tick, Eastern blacklegged tick, Western blacklegged tick, Groundhog tick, Gulf Coast tick, Lone star tick, Rocky Mountain wood tick, and soft tick, with an overall accuracy of 97% and precision, recall, and F1 score metrics of 0.96, 0.97, and 0.96, respectively. This freely accessible app shows promise in assisting tick bite victims with their decision to seek further medical assistance, particularly those with underlying health conditions.

Awards Won:

Third Award of $1,000