An Intelligent Security System for High-Terrorism-Risk Cities: Real-Time Prediction, Weapon Detection and Instant Solution (ISTC)

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Large scale conflicts are one of the most concerning issues of our era. Since 2011, the United Nations estimates more than 100,000 people have been killed. At least 10,000 were children with many more maimed. Yet, the casualties could be significantly reduced due to several communication problems and a major lack of relevant data before, during and after terrorist attacks. An easy to use, low-cost, end-to-end security system was developed for this purpose. It predicts the likelihood of next terrorist acts based on latest social media activity in nearest cities of the user's location. A sound weapon detector was created thanks to a Convolutional neural network trained on a manually recorded, explored and cleaned data-set. A notification system was implemented to provide its users with potential threats by locating nearby hospitals once a danger is detected. LSTM units were trained on the word embeddings of the Global Terrorism Database as a NLP supervised learning approach to identify terrorism-related posts. It achieved 80% test accuracy after 100000 iterations. It outperformed the lexicon-based approach when tested with new posts. The sound weapon data-set was used to evaluate different classification models using both the sound pressure information and the frequency space representation of acoustic data. The CNN achieved the best test accuracy (84%) after 2500 iterations. The system was able to update its state with respect to each environment variables in only 4 seconds. An android app was developed to connect the user to the server using Firebase. A microphone and a nano-computer (Raspberry-Pi) were added as the system hardware of the final prototype.

Awards Won: