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CovaCare Security Considerations

CovaCare is a system that detects falls and inactivity with in-home cameras. As a result, it handles a continuous stream of sensitive video data. We have taken a series of steps to ensure our system is private and secure.

Local Video Processing

CovaCare's architecture was designed around privacy. Many modern systems use cloud servers to run complex algorithms, but we do all of our computing locally. Cameras will communicate over a private network with an in-home server, where all of our machine learning and video processing is done. The only external connection is our alerting service, which is solely used to send SMS notifications to emergency contacts. For more details, refer to our architecture diagrams.

Very Short Term Data Retention

In addition to running on a local server, CovaCare does not retain any video data. Streams are processed in real-time, with frames immediately discarded. The only data that is stored is a 30 frame window of pose estimations, and a 60 frame window of fall detection model predictions, neither of which contain sensitive information. CovaCare has a SQLite database, but that only contains emergency contact information and camera settings.

Network Level Access Control

CovaCare's video processing module cannot be accessed directly. All configuration options for the system are handled through a separate API. This API has endpoints for changing the system's emergency contacts and camera settings. CovaCare's API will be hosted on a VPN-protected virtual local area network, to ensure only trusted individuals can change configurations. All authentication and access control is handled by this architecture, and any user with access to the API has full permissions.

Secure API Communication

CovaCare's VPN-protected architecture means that, in theory, only trusted individuals will have access to the same network. Despite that, we still planned to use encrypted API communication through HTTPS. Unfortunately, our mobile application does not work with self signed certificates. Furthermore, obtaining certificates from a trusted authority may add significant complexity to a local network. We would need to perform a more detailed assessment of our options before going to production.

Trusted Alert Provider

CovaCare relies on Twilio as its alert provider to connect with emergency contacts. Twilio uses industry standard security protocols, encrypting data in transit and at rest. It is trusted by thousands of businesses globally, including Netflix and Airbnb. https://www.twilio.com/en-us.