Assist-MD - Vision Statement

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Why is this technology Important?

Assist MD will not only assist in making medical jobs easier and reducing the amount of paperwork but will give doctors the ability to make advancements in their respective fields. The insights Assist MD will provide patient health and biological responses to surgical procedures which will allow for faster improvement in a doctor's surgery performance. Managers need to track personnel in the operating room and log records of entrances and exits; automating this process could help prevent errors from being made and help with accountability. Insurance companies need to have records of which tools were used during the operation, again we can streamline this process. This technology could also help surgeons keep track of tools post surgery.

What tasks will Assist-MD be able to perform?

- Real-time medical Instrument inferences will be made in surgical procedures which will keep track of what instruments were used at what time
- Smart room functionality to log metrics of medical personnel flow into and out of the operating room and track unique personnel in the operating room.
- Knowledge of instruments being used by camera inferences as well as a post-surgery check to make sure all instruments that were used in the surgery are accounted for.
- Provide instrument usage metrics and personnel involvement metrics through entire surgeries

What tasks will Assist-MD not be able to perform?

- Identify Medical personnel, as this is not HIPPA compliant and violates some rules
- Give feedback on the how well or bad the surgery went
- Will not measure biometrics. It will only analyze existing biometrics
- Identifying the medical scene
- No spoken commands. Most likely will find videos based off of keywords.

What problems are Assist-MD going to solve?

- Event-logging will create more useful documentation and indexing of surgical procedures, techniques, and traditional practices
- Medical staff will now be much more protected from the possibility of leaving instruments inside patients
- Information for insurance companies and hospital operations managers (i.e. number of personnel involved and instruments used at any given time) can be automatically and accurately compiled

How are these problems addressed today?

Medical staff write down by hand what tools were used during the surgery. If it is unclear which tools were used from a particular set, the whole toolset is written down, even if only some of the tools were used. Doctors and nurses in the room are also counted manually and written down by hand.

Milestones Outlined

The first milestone will be to get an end to end web app going. Perhaps a picture can be sent from the front end and AWS captures the request and sends back an answer as to what the object is. The next milestone will be to analyze a constant stream of data coming from a webcam. After that, we could then build a time series of when instruments were utilized.

After some, or all of this information is analyzed, we can finally build out the data presentations. For this, we think it best that a web dashboard is built to view this compiled data and event time series, organized much like patient files would be organized. The final piece here would be to compile surgical reports and PowerPoint summaries.

Challenges

The most challenging task is most likely the tracking of unique medical personnel who enter and exit the room.

Technologies Utilized

Sagemaker will be used for all computer vision and pattern recognition algorithms, with docker applications stringing the outputs together to compile the data. Videos of instruments on treys will be fed into an agent that orchestrates throughput to SageMaker. We are also hoping to get access to a camera feed from an actual operating room. Time series charts and other data collected will be presented on a live frontend website, built using React-Native that leverages scripts to allow for the option to download summaries as PowerPoints or PDFs. Requests will be sent to AWS using Axios, a Javascript library. PowerPoint will be used in the automatic compilation of surgical data from the website and be made downloadable.