

**Project Title:** AI for Ensuring Clinic Quality in Telehealth Consults

**Company:** Teladoc Health

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### **Project Summary:**

- **Problems**

- Currently no monitoring of conversations between doctors and patients
- Clinics are unable to identify malpractice
- Clinics want to prevent unreasonable/unwarranted ratings for their doctors
- Doctors could benefit from diagnostic assistance in analyzing symptoms. Technology could enable doctors to ask the right questions and provide additional information
- Doctors have limited time to meet with patients and thoroughly study patient data

- **Why are these problems important?**

Building trustful relationships between doctors and patients is one of the biggest problems in telehealth consults. Doctors may encounter some unreasonable patients and find it difficult to assert their own rights due to privacy protection. Patients, on the other hand, may encounter unprofessional behavior during consults. A third-party analysis tool that objectively identifies malpractice or anomalies in consults could enable clinics to provide more reliable services. Additionally transcribing patient symptoms can allow clinics to identify instances of similar medical cases which may prove useful to doctors.

- **How is this problem solved today?**

Currently, clinics are unable to identify malpractice or other anomalies in telehealth consults. We are unsure if commercial software that gathers data about the sentiment of doctors and patients during telehealth consults exists. Furthermore, doctors rely on medical scribes in order to take notes regarding the patient's health. Telehealth consults make use of telescribe programs which provide transcripts of the appointment. However, these services fail to identify topics the patients feel uncomfortable answering.

### **Project Outcome:**

1. Ensure doctors are behaving themselves by proactively identifying and labelling consults with malpractice. Which enables a third party auditor to view consults with potential malpractice.
2. Ensure patients have legitimate concerns in the context of doctor ratings by looking at the patient's reported symptoms and behavior combined with the doctor's diagnosis and response.
3. Ensure doctors are asking the right questions based on a set of symptoms by suggesting common conditions associated with the symptoms. Doctors will be able to view the transcribed symptoms and possible conditions within the telehealth consult dashboard.

### **Solution Implementation Details:**

1. Convert audio from calls to text using [Amazon Transcribe Medical](#)
  - a. Speaker diarization to identify speakers and split audio based on the speaker
  - b. Generate a transcription of the audio for both speakers
2. Setting up a database to store telehealth consult videos, transcripts and sentiment analysis data
  - a. Store sentiment analysis data and transcripts in DynamoDB
  - b. Store video in AWS S3 Bucket
3. Add account creation/login authorization to allow authenticated users to access data
4. Use React to create a user interface over the data
  - a. Analysis to bring back instances of particular symptoms such as "fever", "cough", etc.
  - b. Show all instances of profanity usage to identify potentially problematic interactions
    - i. Visualization of Consult Sentiment Analysis
    - ii. Toggle to display the sentiment analysis for the doctor and patient
  - c. Running algorithms to find natural occurring topics
  - d. Extract key information from consult transcripts using NLP tools such as [Amazon's Comprehend Medical Service](#) for diagnostic assistance
5. Elements in UI designs for doctors and auditors
  - a. Audio and Video of doctor and patient
  - b. Patient's medical record. Instant charts that show patients' breathing speed
  - c. Suggested questions for doctors based on particular symptoms (4a) and topics in (4b)

### **Milestones:**

1. Speaker Diarization and speech to text
2. Train and compare different models to classify problematic calls and normal calls
3. Train models to identify and alert about types of inappropriate behaviors and find anomalies
4. Create a user interface to allow Doctors and Authenticated users to audit and review consults
5. Display summaries of telehealth appointments for Doctors
6. Display questions and potential conditions to enable the doctor to gather more patient information