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Facts about Autism Diagnosis around the world(Why we built this)

- 28.6 kids in 10000 births suffers from autism.
- Preparation points for the pitch:
- Our aim is to harness the power of machine learning and computer vision to build a universal application that can help serve in the quick diagnosis of neurological disorders.
- Firstly, there is a severe lack of counsellors and mental health specialists around the world and with facts such as 62 people having autism spectrum disorder in every 10,000, it becomes more important that we use this scarce resource with exptreme importance.
- 72% cases that visit a counsellor for autism diagnosis are false positives, which increases the wait time for someone who might need to get their child diagnosed.

Our Project

- We built a website application that utilizes Computer Vision and Machine Learning in order to predict if your child might be autistic and will need a visit to a counsellor.
- We based our predictions on two main factors:

1. Autistic children are unable to control their emotions. If you were to show an autistic child a happy video, you might get reactions such as surprised or unhappy, because the sound might irritate them.
2. Autistic children are unable to maintain good eye contact. Example, if you were to display a figure in the middle of the screen, the autistic child may look at the edges of the screen and not focus on the moving object.

Our Design Strategy

- We started with the implementation of an HTML form for the parents to fill out, regarding any diagnosis or prognosis for their child's condition in the past and his age.
- We then move onto our React.js application. This application is split into two parts.
- The first part is for children below 3 years of age, and it basically displays a happy video. While the video is playing, we capture the child's face.
- The second part is for children above 3 years of age, and it is a flappy bird game.

The Backend

- We built a python model which is split into two phases, emotion detection and gaze tracking.
- The emotion detection model utilizes a google deep neural network library that helps in the detection of emotions from the child's face. We then take the mean of all the emotions and if the child is displaying a variety of emotions in contrast to the stimuli, we take that as one signal.
- The second is the eye tracking which is extremely essential, we are utilizing a Berkeley Deep Vision framework that tracks the movement of the eyes on the screen when the child is interacting with the model. The model draws points on where the child's eyes have gone. We compare the distance of these points from the center of the screen and if a certain number of points lie in the outlier areas, we take that as the other signal.

The combination

- We combine the two signals we receive from the python backend and using a percentage model we predict how autistic your child could be and then suggest whether you should or should not visit a professional counsellor for a holistic diagnosis.
- In addition, our model produces graphs and visual representations of both the factors, so that it is easy for a counsellor to read and analyze.

The future

- If successful, we aim to make this is a realistic and sustainable application that is available on both mobile and web.
- In addition, we can add functionality and algorithms to extend it to other mental disorders, for example depression or anxiety.
- With the idea taking shape and support from all the sponsors, we envision that the idea will take shape quickly and be extremely popular among people of all ages.

AWS as a backbone

- Due to the large computing demands of the backend, we hosted application on aws servers, using the free tier subscription.
- We made use of the aws SageMaker application to train our deep learning models.
- This enables our application to be available 24/7 and usable from around the world.
- In addition, we were able to track usage data and analytics from the aws console.