

Instant Vital Checkup (IVC)



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Problem Statement :

Each day, thousands die due to medical negligence and delay in attending critical patients due to delay in completing pre-surgical procedures because of lack of nurses and a big volume of patients.

Sometimes these procedures take more time than the actual appointment, not to mention the costs involved in getting these procedures done.

We aim at automating such procedures using Computer Vision (OpenCV) and Machine Learning (ML) technologies.

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Problem



Motivation

Each day, thousands die due to medical negligence and delay in attending critical patients. Most of the time this is due to delay in completing pre-surgical procedures because of lack of nurses and a big volume of patients.

We wanted to innovate a solution which would help us mitigate such unfortunate casualties and at the same time be widely accessible to all patients.

This motivated us to develop Instant Vital checkup (IVC) .We think this can bring revolution in the medical and SaaS industry.

Problem



India is a country with huge and diverse population where a good fraction of people live in villages and other remote areas with inadequate healthcare facilities. Furthermore the patient load on government hospitals is a lot. These circumstances lead to medical negligence and delay in treating patient which might be fatal.

You might have experienced the same. Remember going to see the doctor for a common cold and being told you can only see the doctor after completing the pre-requisite checks like height, weight, bmi, pulse, temperature, etc? Sometimes these procedures take more time than the actual appointment, not to mention the costs involved in getting these procedures done.

We aim at automating such procedures using Computer Vision (OpenCV) and Machine Learning (ML) technologies.

Proposed Solution



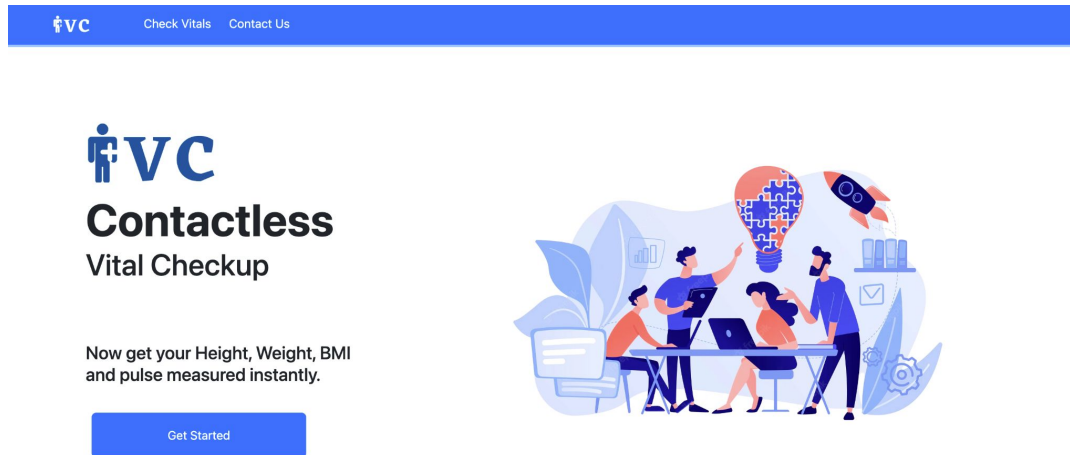
With the power of Machine Learning, Computer Vision and a few well placed sensors, we can entirely eliminate the need for a human attendee in the pre-surgical procedures, giving us quicker and more reliable results. This would eliminate the otherwise time and human intensive work of measuring vitals of a person.

Using well placed cameras, we will be able to monitor the body temperature, pulse and get a good estimate of the weight and height of the person to get an idea of their Body Mass Index(BMI). This would be done while the person is filling out the registration form, thus ensuring quick treatment for the affected.



We start with a website, this would be used at the reception desk to find out the vital information about the patients.

Our website is very intuitive, easy to understand and use.



Our website uses the webcam to record the video of the patient.

This video is then sent to our backend where we use computer vision and machine learning algorithms to estimate the body measurements , pulse and other vitals.

Afterwards the generate the result and display it as a report so that staff at reception desk can fill in the details of patients quickly and effectively thus saving time, money and human effort.

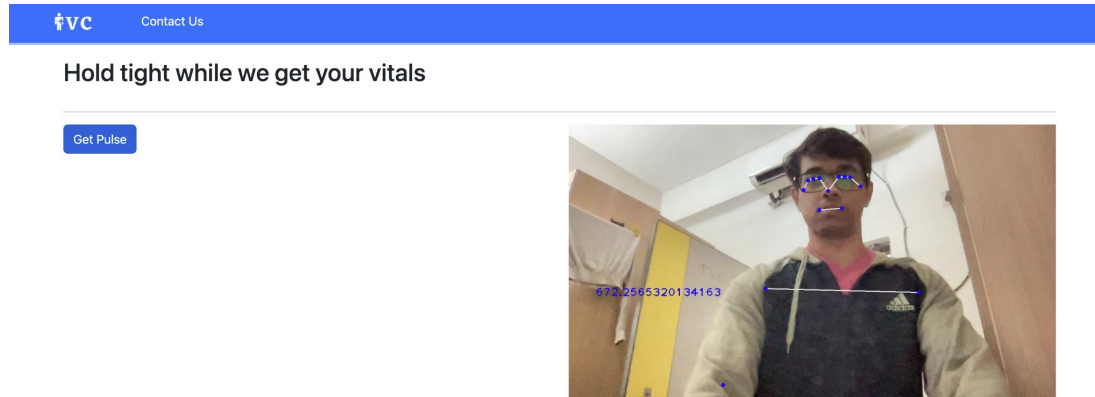


Body Measurements



IVC has a special setup where when the person is at the marked spot, the camera takes his/her picture, and using trigonometric ratios, the person's **height, arm length, waist breadth, and leg length** are determined. Presently two parameters need to be hard coded (height and distance of camera).

We also made an approximate guess of **waist circumference** using frontal waist breadth.



Age and Gender



Using a pre-trained open-source deep neural network and computer vision which takes video feed as input, we estimated a person's age and gender.



Weight

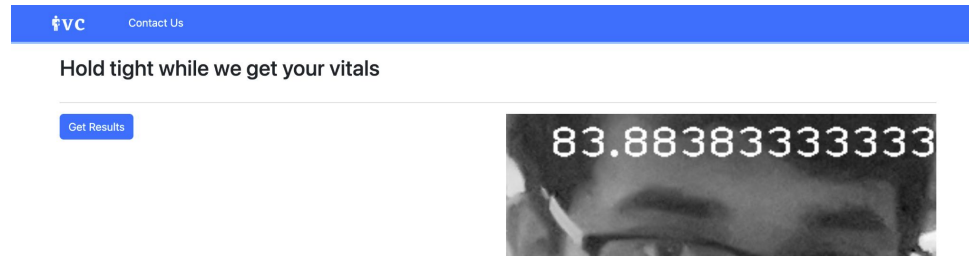


Using the parameters estimated in the previous slides i.e. height, arm length, leg length, gender, age, and waist circumference, we trained a random forest model to estimate the weight. The model was able to deliver an estimated accuracy of 98.6%.



To get your pulse measured the person has to walk towards the camera.

The camera takes a zoomed video of the forehead, using computer vision we are able to estimate the pulse of a person by measuring the change in skin colour of the person's forehead.



Further Information



Pulse:

By monitoring the changes in skin colour, we can get a fairly accurate estimate of the pulse of the person. In our testing, on cross validation with a fitness band from a trusted brand, we were able to obtain the pulse with an average margin of error of 4 bpm. This can be improved with better cameras and calibration to be of medical significance.

See this link for more information: [Blog Link](#)

Body Temperature:

With a thermal imaging camera, we can get accurate body temperature of a person. This eliminates the need for a thermometer, which is not only time consuming but also prone to hygiene issues.

See this link for more information: [Blog Link](#)



Further Information



BMI(Body mass index):-

Body Mass Index (BMI) is a number calculated from a person's weight and height. Using data from cameras and image processing techniques we can estimate BMI with precision. It is a reliable indicator of body fat percentage which in turn is used to screen for weight categories. [Blog Link](#)

Soft detection of visually diagnosable diseases*:-**

Further implications of this technology includes detection of diseases which are visually diagnosable. This would help in reducing the load on the doctors and reduce overcrowding in hospitals. This would help in more effective treatment of critical patients which is need of the hour.

*** Future prospective

Potential Impact



- Our innovation can be a life saver for an individual.
- IVC can help reduce the load of patients on hospitals by providing diagnosis for non-life threatening ailments
- People would be more motivated to lead a healthier lifestyle as they could see their progress everyday.
- People who are not in close vicinity of a hospital or a medical professional can easily self evaluate their health status.

