

SHE HACKATHON

Team: camelCase

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SOLUTION ROAD MAP



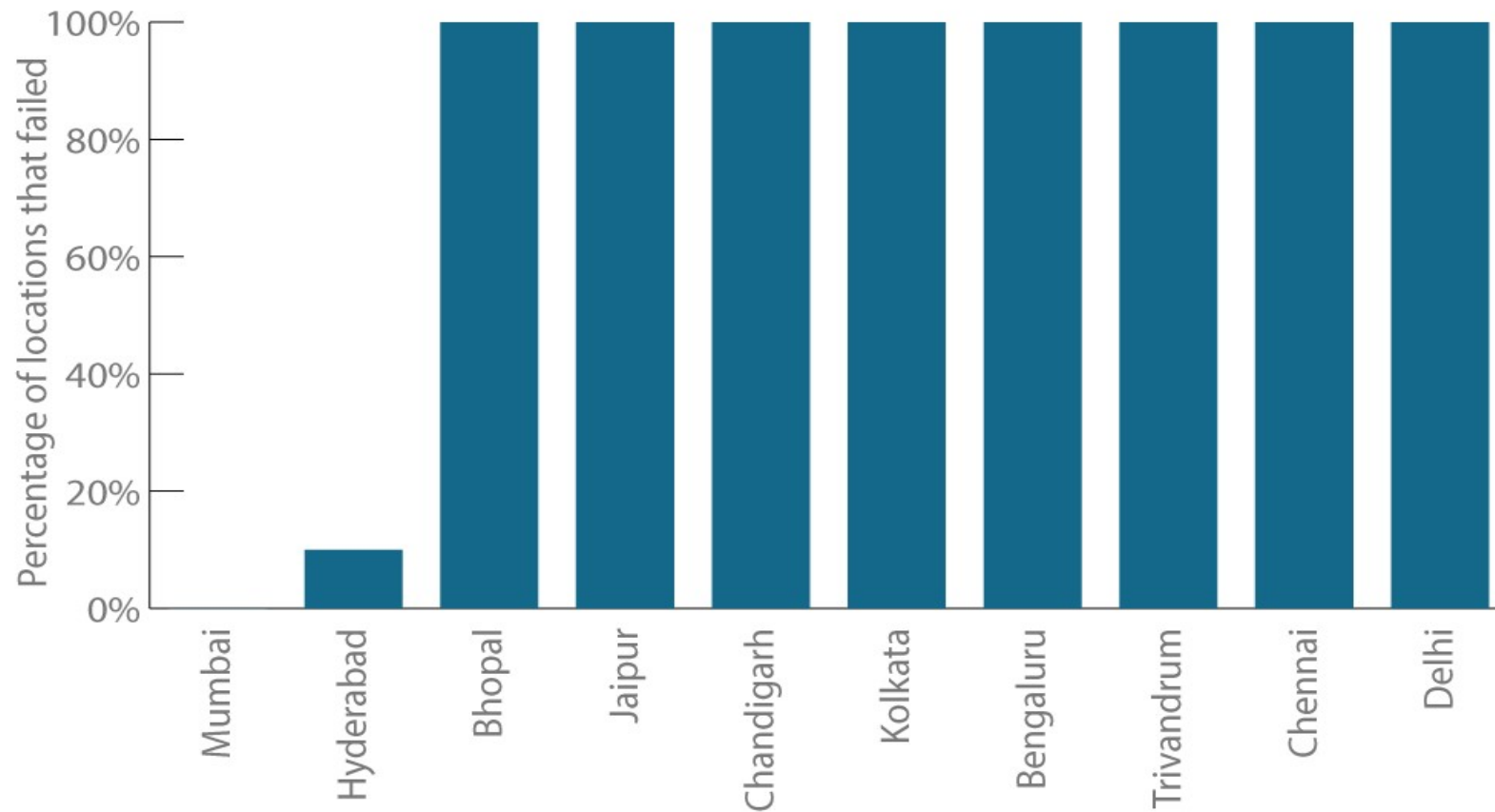
REASON FOR BUILDING CLEAN WATER AI

A large number of people are being affected by contaminated water.

While we think water is safe in cities like Mumbai, Hyderabad etc... But Chennai water crisis has proven to us that even in cities like Chennai, we still face water safety issues.



Percentage of locations within city where samples failed tests



Note: Water in cities was tested at 9-11 locations. The percentage of locations that failed tests in each city is represented.

Source: Bureau of Indian Standards

THE NEED FOR A SOLUTION

Water safety can be difficult to maintain across the vast distribution of a municipal water system.

Contamination by bacteria or dangerous particles is often difficult to detect before health issues occur.



THE IDEA

AI detects water contamination issues, using trained models to recognize harmful particles and bacteria.

Distributing devices that monitor water for problems will help cities detect contamination as quickly as possible.

Monitoring water safety in real time

Clean Water AI uses AI and high definition cameras to detect bacteria and particles in a water source.



THE SOLUTION

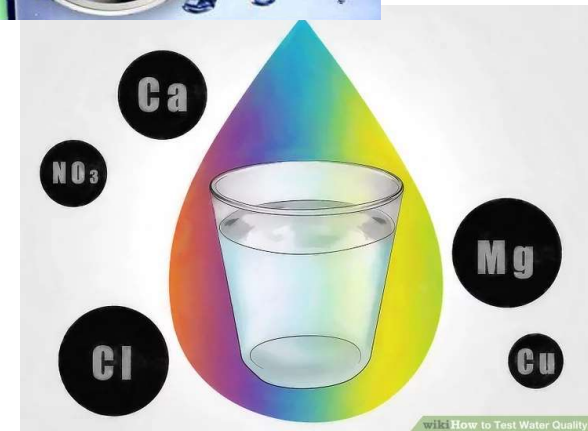
So, we have come up with this idea of building an Artificial Intelligence project to tackle with this issue.

Clean Water AI:

Monitors the quality of water continuously

Detects harmful pollutants in water

Detects the presence of bacteria in water



DETAILED DESCRIPTION OF OUR SOLUTION

1. Component list for the IoT

Since we are planning to We'd need following items

- Up2 board
- Movidius PCIe card (or Movidius NCS) for AI on the Edge (picture showing both)
- Helium Atom Module and Helium Access Point.

2. Setting up Azure Machine Learning for training

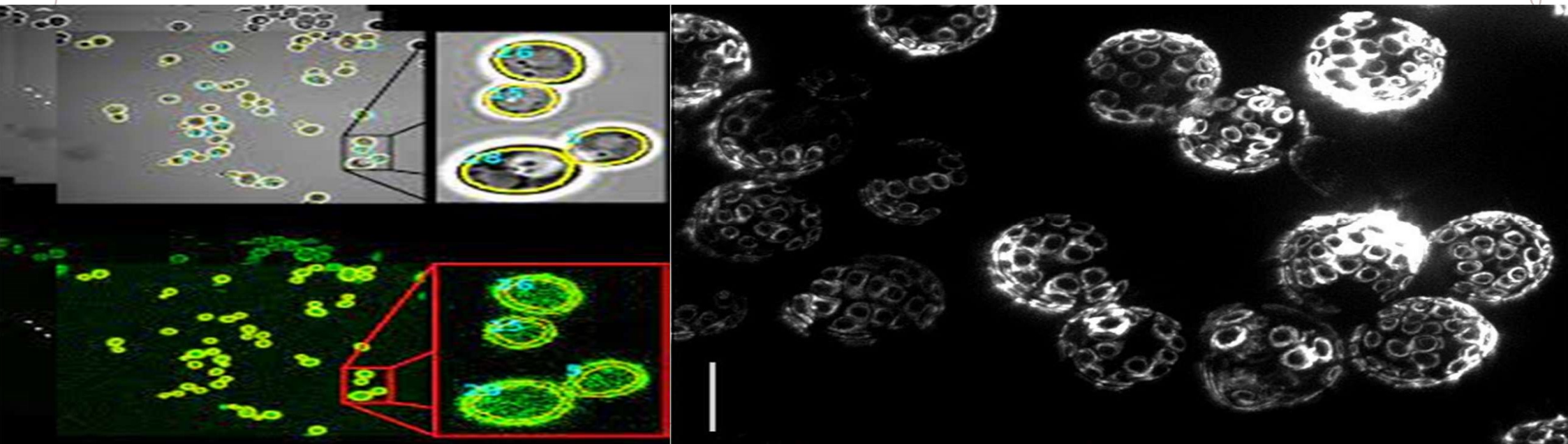
First, we'll need a computer to train the data, there are many options here since our dataset is relatively small.

3. In this step, we are going to divert our attention towards the concepts of computer vision and image classification.

For this, we need to:

- Build contamination/clean image classifier using deep learning algorithm, the Convolution Neural Network (CNN) through Caffe Framework.

For this, we will train the yeast cells as the data for bacterias is difficult to obtain on internet.



5. Training AI Convolutional Neural Network (CNN)

Convolutional neural networks are feedforward neural network. They model same as of a visual cortex of human beings. This way it does extremely well on visual recognition and image classification tasks. The convolutional layers and pooling layers inside CNNs allow the network to encode images properties and extract features. For the current guide, we will be using Caffe Framework for the easily deployment on Movidius NCS.

Once data is collected, we need to copy them into our server

6.Setup Azure SQL Database

Next we need to be able to store the data coming from IoT device. There is a great guide about this written in detail on

<https://blogs.msdn.microsoft.com/sqlserverstorageengine/2018/01/23/working-with-azure-iot-data-in-azure-sql-database/> In this article we will focus on quick integration of how that happens. We first go to SQL databases to create a database as image below, we can select Basic Tier

7.Display the Data

We now have IoT inside Azure from end to end, only thing left is display the data, use following code to get the latest data which can be displayed over the webpages on Azure Map.

You can easily access the data via

```
http://<yourapp>.azurewebsites.net/api/data?code=<functionkey>
```

From that, we can get the data and use html to display the data as needed. Using Azure Maps or other maps, we can easily display the following through calling the API. the code for [index.html](#) will be in our GitHub repository. In the future we can classify more bacteria and display them across the map, and use pattern recognition to figure out where the contamination starts.

