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Tata Centre for Technology and Design
IIT Bombay

TURNING POINT

Tata Centre Newsletter, August 2020

Testing the spoken language assessment system

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A new industry partner

EDUCATION

This Education project has partnered with a CSR foundation to reach its prototype out to the end users at an early stage

The seed project Spoken language assessment on mobile devices led by Prof Preeti Rao, from the Dept. of Electrical Engineering, has just brought in news of sorts. The team has collaborated with WPP India CSR Foundation at an early stage with plans to conduct pilot tests with the developed prototype.

This TCTD project has been developing automatic and objective means of literacy and spoken language assessment for large-scale monitoring of learning outcomes in the course of education interventions at primary and middle school levels. The assessment system returns skill ratings for an entire cohort up to any desired granularity on individual recordings of oral reading. It can be applied to generate group analytics. The learner's word decoding accuracy and speaking rate in terms of global standard rubrics such as words correct per minute are measured. Fluency and expressiveness indicative of the comprehensibility of the speech and therefore crucial to effective communication are other parameters also assessed. Since the team works directly with education administrators and content providers, the system can be customised for any language and choice of text material.

A collaboration with the foundation, at this early stage, involves customization of the assessment system for age-appropriate content provided by the partner, conducting pilots across four schools in two cities in terms of organizing reading and recording sessions across cross-sections of skill levels in different classes. The foundation is known for its work with underserved communities specifically to improve learning outcomes and enhance employment-readiness. This technology solution should see use in their education interventions for English at the school level. While the project team at IIT Bombay will be working for the first time with end users, the collaboration will definitely balance the minimum expectations and keeping up with delivering based on immediate feedback. Feedback from the pilots is expected to be useful for system validation and for providing pointers for improving the effectiveness to end users of the technology.

This partnership is being seen as a timely step ahead allowing the project team to prioritise the future development in terms of actual market needs and to focus R&D efforts appropriately.

The Project Team

CoviDialysis to the rescue

HEALTHCARE

The CoviDialysis service has been operational for over two months, and a 1000 Covid-19 suspect/positive hemodialysis patients have used this service effectively.

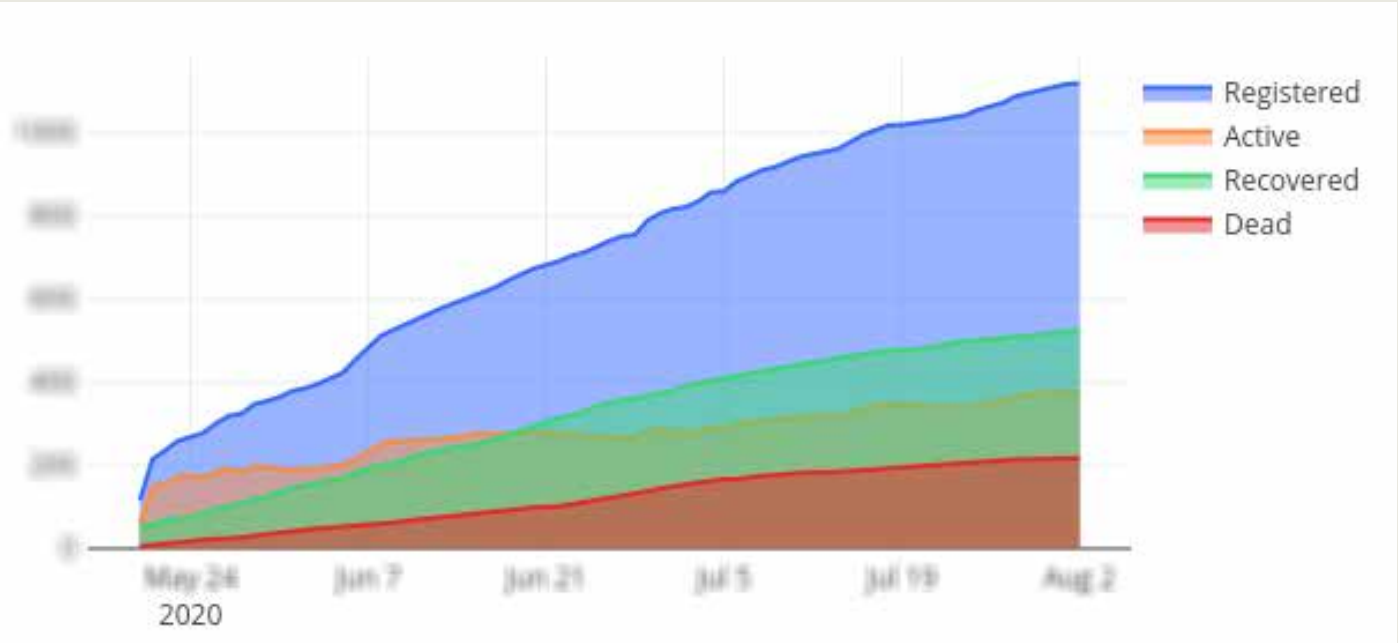
The CoviDialysis project is a TCTD solution that has been developed at the beginning of the pandemic and is in full use as a service, in a live setting.

In March this year, information was being received that a number of patients with chronic kidney disease (CKD) were being denied dialysis care as they had tested Covid positive or were suspect with the symptoms. Dialysis centres were concerned about contamination and other Covid-related issues. The designated Covid hospitals had limited dialysis capacity to handle what was a rapidly escalating number of Covid positive outpatients. Consequently, Covid positive or suspect patients were forced to find alternate centres on their own.

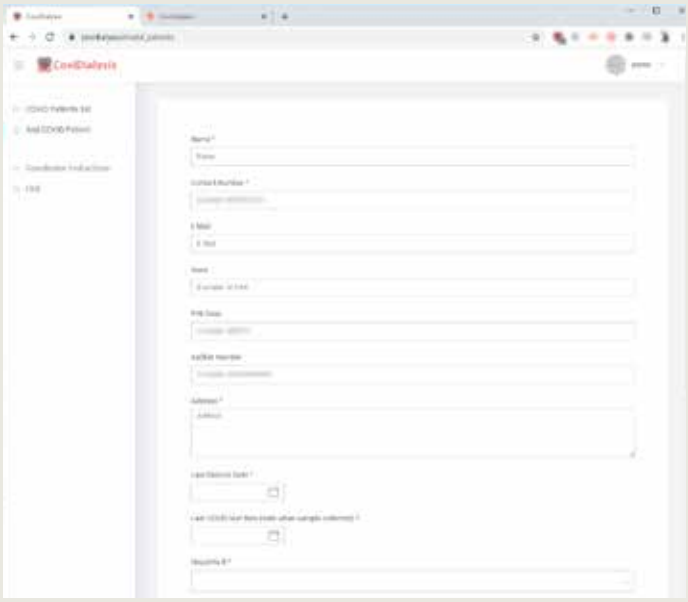
With clinical evidence from Wuhan and elsewhere in the West, CKD patients were also known to be a patient group with a high case fatality rate on turning Covid positive. Approximately 200 dialysis centres across the Greater Mumbai region have been catering to about 10,000 patients with CKD, with these patients needing dialysis services twice or thrice a week, on a timely basis and towards guaranteeing a fair quality of life.

A logistics-related challenge was thus identified, with the need for an IT platform for better patient management and coordination. The project team, with Prof Santosh Noronha, Professor-in-charge, TCTD, and Dept of Chemical Engineering, and Prof Narayan Rangaraj, from Dept of IE & OR, collaborated with Dr. Vishwanath Billa and a group of other Mumbai area nephrologists to work on engineering a solution. Three engineers from the Telepathology project - Amaldev Venugopal, Venugopal Pai, and Akshay Toraskar, put together the portal.

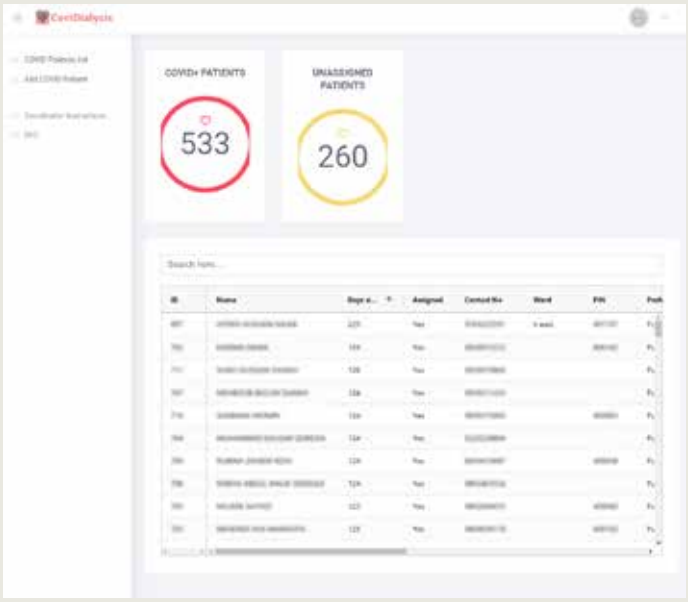
The CoviDialysis portal was built to facilitate rapid assignment of patients to alternate dialysis centres as a consequence of testing Covid positive. The in-charges of the 200 centres were already in communication via a WhatsApp group. The MCGM mandated that all these centres would now report



Activity noted in patients using the CoviDialysis service



Forms collecting patients' data for the service



A snapshot of the CoviDialysis portal

to the portal via an app, thus enabling the free slots available for patient reassignment as well as handling a list of Covid positive patients.

When a patient turned Covid positive, the original dialysis centre was to immediately communicate via the app back to coordinators manning a dashboard, which then facilitated rapid assignment to a nearby centre with spare capacity for handling Covid positive patients. Both sending and receiving centres would then contact the patient and direct him/her to the new facility. There was a quick turnaround to reassigning patients, in the order of hours.

As of early August, approximately 1200 hemodialysis patients have turned Covid positive and are registered in the CoviDialysis system. This could be the largest Covid-dialysis management effort worldwide. A data reconciliation effort is underway towards better understanding of patient progression through the course of the infection and their outcomes. It is painfully clear from the data gathered so far that this is a comorbidity with an extremely high case fatality rate (>15%). This implies that unaffected dialysis patients will continue to seek shelter into the longer term, until an efficacious vaccine is manufactured and deployed. There has also been a group of patients without any CKD, but experiencing severe Covid-related problems and suffering acute kidney injury. They have had to be handled by outpatient dialysis facilities for Covid suspect patients, as they recovered, in most cases, fully.

The CoviDialysis service has been offered to nephrologists at New Delhi and Bengaluru as active Covid patient numbers there increased, but there has been little response. Clearly the MCGM's mandate to the Mumbai-area dialysis centres to cooperate with the coordination effort has been effective, and it could just be that the other cities may need such central mandates.

The source codes for the platform are available as open source, and the data collected into this system would be a resource for further public health discussions.

The Project Team

BodhiTree - the online teaching solution

EDUCATION

This project has been the solution to teachers in their search for online learning platforms in these times of compulsory virtual learning.

The Covid-19 crisis has brought in the urgent need for teachers to go online with their classes.

In this scenario, TCTD's BodhiTree project - an online learning platform that provides accessible quality technical education for all – has been a sought-after solution. This project, headed by Prof Kameswari Chebrolu, Prof Bhaskaran Raman and Prof Varsha Apte, Dept of Computer Science & Engineering, works with the philosophy of empowering each individual teacher to reach his/her students online.

The BodhiTree platform can be viewed both as a publisher of multimedia books as well as a Learning Management System (LMS). The platform BodhiTree and the interactive multimedia textbooks hosted there in act as an aid to teaching for teachers, as opposed to the replacement of teachers as that massive open online courses suggest. The teachers have full control via a very rich set of features to manage their subject offerings. In addition, the rich laboratory support is easy to install in institute premises or on the cloud.

With unprecedented demand from the teachers in the current pandemic, the project team conducted a teacher training workshop for over 10,000 teachers. This workshop covered aspects like creating videos, reducing their size, editing them, managing content, conducting quizzes, etc. Over 6,000 teachers who experienced the workshop came back requesting another in-depth focused workshop, for a hands-on experience on how to use BodhiTree as instructors. These teachers from across India and from various disciplines got temporary instructor accounts to explore the platform. They also accessed the platform over a variety of devices, browsers and network speeds, thus validating the robustness of the technology solution. The Teaching Learning Centre (ICT) at IIT Bombay, funded by the Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching, and headed by Prof Kannan Moudgalya, took care of the organization of the workshops that were conducted.

The outcome of these workshops has been encouraging. About 1,500 teachers requested for free instructor accounts. With limitations in resources, the project team handed out accounts for only about 250 based on performance. The feedback to make it more user-friendly has been addressed since and a few minor bugs have been uncovered since.

Many institutes have expressed interested and proposals have been submitted for installation of BodhiTree on servers under their control. The project team is also in talks with the local KV school management to help train their teachers. Basic `paid' plans have been offered and some teachers have signed up for these as well. To support these plans, a few changes in the platform by curtailing some resource-intensive features and monitoring frameworks to track usage are being made.

The Project Team

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