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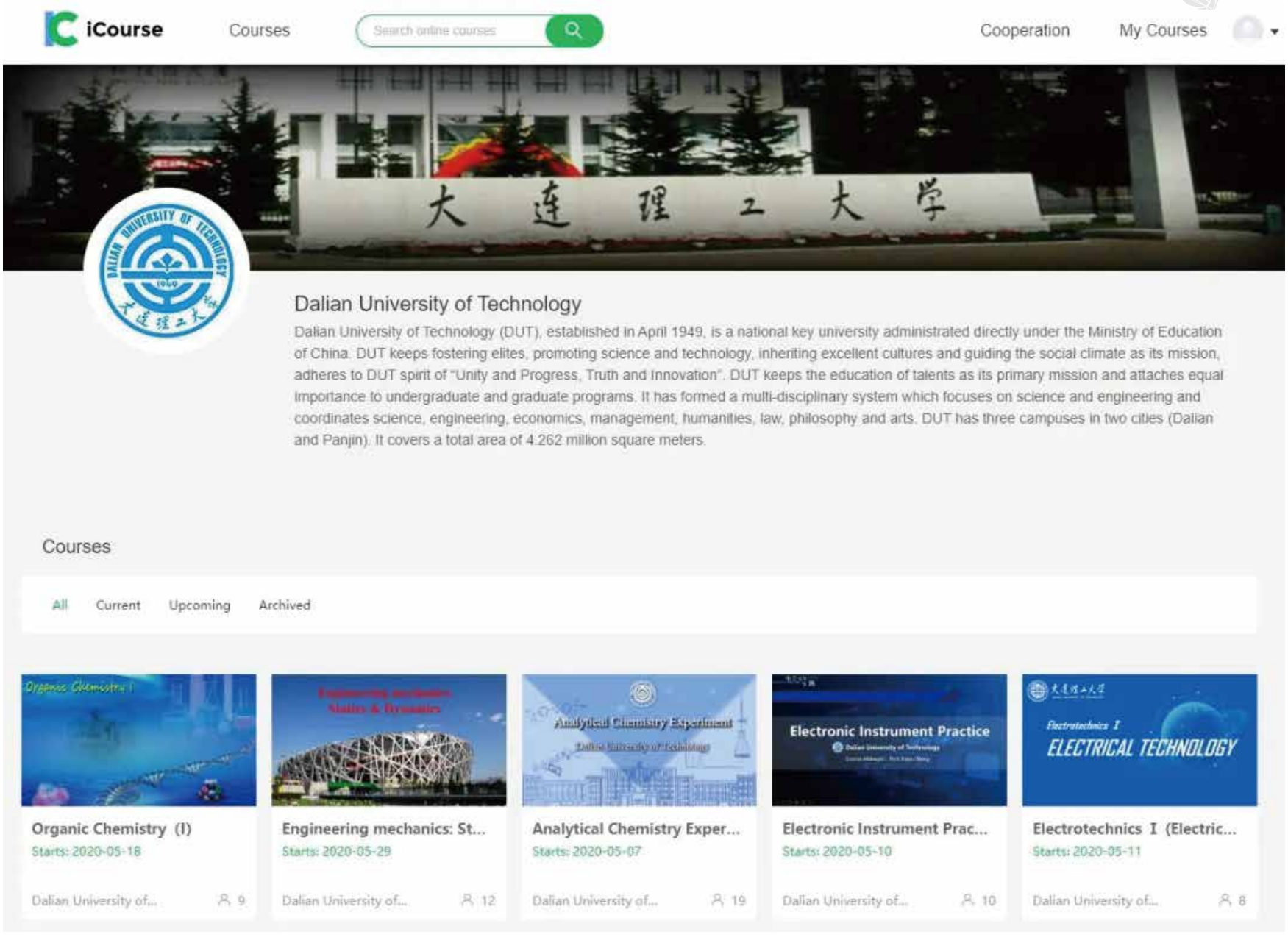
DUT Launched 13 Courses on International Online Course Platform

Source: Academic Affairs Office



Under the circumstances of the world's epidemic prevention and control, Ministry of Education of the People's Republic of China has started the construction of an international platform for online teaching, aimed at providing high-quality online course resources for students from all over the world, and providing as much learning guidance and services as possible.

In order to better serve learners from all over the world, DUT comprehensively sorted out, optimized, and upgraded the existing international courses. The first batch of 13 courses has been launched on the English version of online teaching international platform, covering natural science, engineering and technology, intelligence and virtual simulation experiments, future-oriented and innovation and entrepreneurship, etc..

DUT will take this opportunity to further strengthen the construction of world-class courses, promote the construction and sharing of high-quality course resources, and contribute great efforts to the fight against the epidemic.

DUT Students Optimize the Route for Mask Distribution

Source: School of Innovation and Entrepreneurship

The online competition of the 2020 Huawei DevCloud Software Programming Competition came to an end on May 8th. DUT School of Innovation and Entrepreneurship organized students to participate in the competition, and guided students to care about the needs of the society, exploring the practical methods of municipal mask distribution during the epidemic. After intense competition, the contestants of DUT stood out among more than 2000 competitors achieving one First Prize and one Third Prize. In addition, DUT won the Best Potential Prize.

In this competition, the mask distribution information was inputting step by step. Finding the optimal solution is a Non-deterministic Polynomial-Hard problem. Therefore, Wang Renjian from School of Innovation and Entrepreneurship used the search algorithm to obtain the best delivery route. In order to improve solving speed, he established a series of rules to prune the cases which are not likely to be the optimal solution. Furthermore, it is necessary to select the better one between two paths with the same path length, and optimize for details such as “false collision” and continuous research, so as to obtain a more ideal distribution path in a shorter time.

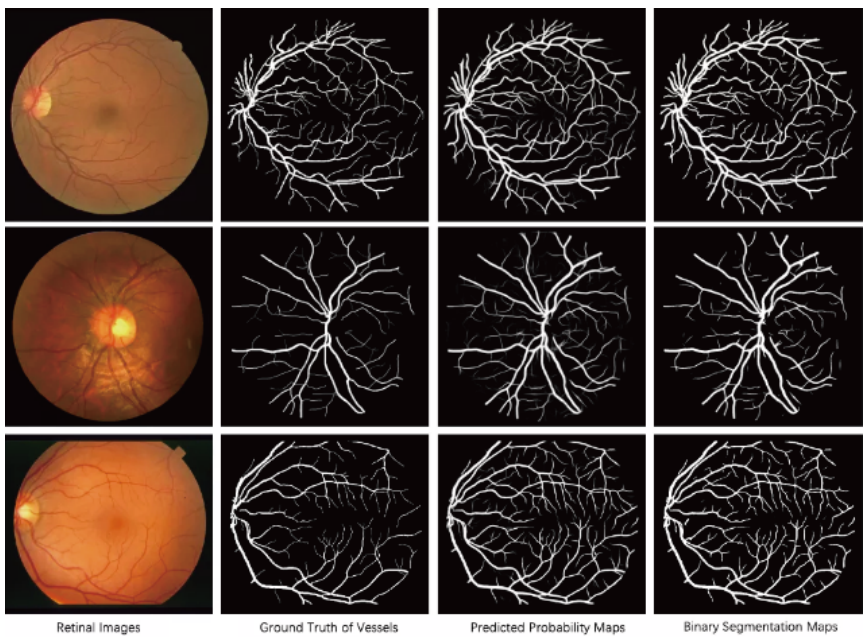
The process and the outcomes of this competition is a good example of the demonstration of the university’s high quality of talent cultivation, as well as the achievements of innovative and entrepreneurial education.

The Joint Research Team of DUT and RU Published a New Progress

Source: International School of Information Science & Engineering, Dalian University of Technology and Ritsumeikan University

Recently, the joint research team of Dalian University of Technology (DUT) and Risumeikan University (RU) has made important progress in the field of retinal vessel segmentation. Their paper *"Boosting Connectivity in Retinal Vessel Segmentation via a Recursive Semantics-Guided Network"* was accepted by Medical Image Computing and Computer Assisted Intervention Society (MICCAI), which is an international top academic corporation in the field of medical image analysis. This research result was jointly completed by DUT Associate Prof. Xu Rui, Associate Prof. Ye Xinchen, Graduate Student Liu Tiantian, and RU Prof. Chen Yanwei from College of Information Science and Engineering. In addition, it was funded by the DUT - RU Co-Research Center of Advanced ICT for Active Life.

Many deep learning based methods have been proposed for retinal vessel segmentation, however few of them focus on the connectivity of segmented vessels, which is quite important for a practical computer-aided diagnosis system on retinal images. In the paper, the research team proposes an efficient network to address this problem. A U-shape network is enhanced by introducing a semantics-guided module, which integrates the enriched semantics information to shallow layers for guiding the network to explore more powerful features. Besides, a recursive refinement iteratively applies the same network over the previous segmentation results for progressively boosting the performance while increasing no extra network parameters. The carefully designed recursive semantics-guided network has been extensively evaluated on several public datasets. Experimental results have shown the efficiency of the proposed method.



Related Research Results of Retinal Vessel Segmentation:

[1] Rui Xu, Guiliang Jiang, Xinchen Ye, Yen-Wei Chen, Retinal Vessel Segmentation via Multiscaled Deep Guidance, Pacific Rim Conference on Multimedia 2018 (PCM 2018), Hefei, China, September 21-22, 2018.

[2] Rui Xu, Xinchen Ye, Guiliang Jiang, Tiantian Liu, Liang Li, Satoshi Tanaka, Retinal Vessel Segmentation via a Semantics and Multi-Scale Aggregation Network, IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2020), Virtual Barcelona, May 4-8, 2020.

[3] Rui Xu, Tiantian Liu, Xinchen Ye, Yen-Wei Chen, Boosting Connectivity in Retinal Vessel Segmentation via a Recursive Semantics-Guided Network, International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2020), accepted. (arXiv Version : https://arxiv.org/abs/2004.12776)

DUT - RU Co-Research Center of Advanced ICT for Active Life

It was established on the development zone campus of DUT in June, 2018. It is an achievement of international cooperation between DUT and RU and mainly conducted by DUT-RU International School of Information Science & Engineering. The Co-Research Center has set up a platform for international research cooperation and communication in the cross research field of health care and information science, and established the "International Research Exchange and Cooperation Promotion Project", which funds relevant researchers to carry out in-depth international research cooperation in ICT (information computing technology), medical and health fields.

Progress in Functional Nucleic Acid Sensors

Source: **School of Environmental Science and Technology**

Protein biomarkers often exist as degradation fragments in biological samples, and affinity agents derived using a purified protein may not recognize them, limiting their value for clinical diagnosis. Recently, Prof. Liu Meng from School of Environmental Science and Technology and his research team present a method to overcome this issue, by selecting aptamers against a degraded form of the toxin B protein, which is a marker for diagnosing toxigenic *Clostridium difficile* infections. This in vitro selection (also known as SELEX) approach has led to isolation of a DNA aptamer that recognizes degraded toxin B, fresh toxin B, and toxin B in human stool samples. In addition, this aptamer showed high selectivity against toxin A and glutamate dehydrogenase. Further studies suggested that the molecular weight of the targeted toxin B degradation fragment was about 50 kDa.

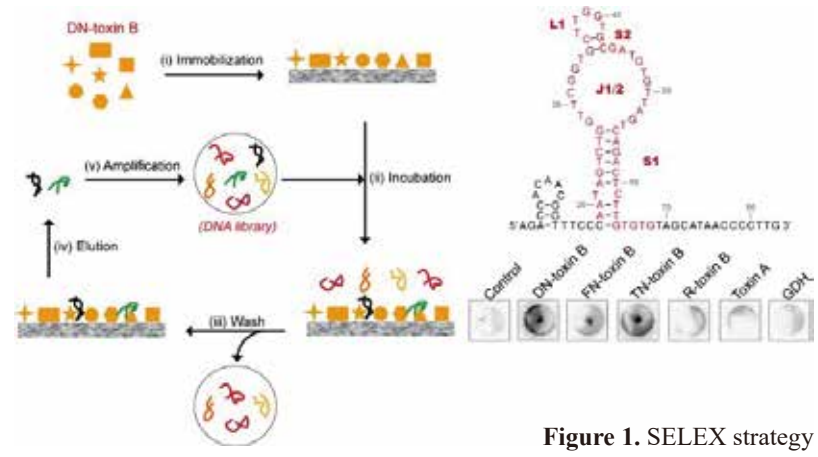


Figure 1. SELEX strategy

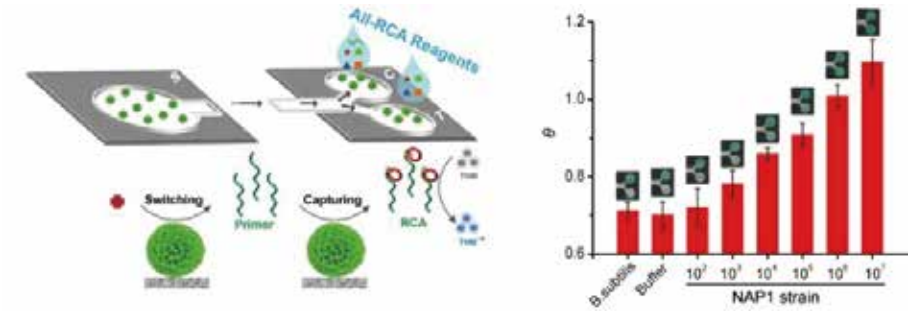


Figure 2. Colorimetric detection of NAP1 strain using paper-based analytical device.

Using this new aptamer, they produced a simple paper-based analytical device for colorimetric detection of toxin B in stool samples, and the NAP1 strain of *Clostridium difficile*. This device can achieve higher sensitivity in a shorter time compared with commercial detection kits. It was able to detect 10^4 NAP1 strains in 30 minutes. The strategies demonstrated by this work can expand the practical utilities of DNA aptamers in clinical diagnosis.

This work was collaborated with Prof. John D. Brennan and Prof. Li Yingfu from McMaster University, Canada.

https://onlinelibrary.wiley.com/doi/full/10.1002/anie.202000025