Annex I-E

THE UNIVERSITY OF HONG KONG

IMPACT CASE HISTORY

The Right Place for Blood Donation and Transfusion in Hong Kong Located by Data Analytics

1. Summary

In recent years there has been an increasing growth in the demand for blood in Hong Kong. Dr Michael C L Chau of the School of Business helped the Hong Kong Red Cross Blood Transfusion Service (BTS) target its services to the right people and in the right format, by conducting data analysis and data mining on past blood donation data in Hong Kong and looking for patterns and trends that would identify where and how the BTS could boost donations.

The BTS took up his recommendation and opened a donation center in Yuen Long in August 2011. The center attracted more than 400 donations per week and most of these donors came from the district, just as Dr Chau had predicted in his analysis model. The project is highly beneficial to the community as the new center allows the BTS to attract more donors.

2. Underpinning Research

The project was based on the data mining research conducted by Dr Michael Chau, Associate Professor in the School of Business. He has conducted a wide range of data mining research and teaching at HKU. The goal of his research in this area is to advance techniques in data mining for different types of data. For example, data uncertainty is often inherent in real world applications that require interaction with the physical world. In particular, data collected from external environments are often imprecise due to measurement inaccuracy, sampling discrepancy, outdated data sources, or other errors. However, such problems are often not taken into account in existing data mining algorithms. One research direction is to study the various issues of mining uncertain data, particularly with respect to data clustering and location-based data mining.

3. References to the Research

Key peer-reviewed publications:

1. Chau, M., Lee, C. K., Chan, C. W., and Cheng, E., "Data Analysis for Healthcare: A Case Study in Blood Donation Center Analysis," in *Proceedings of the Americas Conference on Information Systems*, Lima, Peru, August 12-15, 2010.

2. Ngai, W. K., Kao, B., Cheng, R., Chau, M., Lee, S. D., Cheung, D. W., Yip, K. Y., "Metric and Trigonometric Pruning for Clustering of Uncertain Data in 2D Geometric Space," *Information Systems*, 36, 476-497, 2011.

3. Book Chapter:
   Eggers, S., Huang, Z., Chen, H., Yan, L., Larson, C., Rashid, A., Chau, M., and Lin, C., "Mapping Medical Informatics Research," in H. Chen, S. Fuller, A. T. McCray, and W. Hersh (Eds), *Medical Informatics: Knowledge Management and Data Mining in Biomedicine*, Springer, 2005, pp. 35-62.

Selected external grant funding:

Research Study on Multidimensional Analysis on Blood Donation Data

Funding Body:	Hong Kong Hospital Authority
Principal Investigator:	Dr Michael Chau
Period:	Jan 2013 – Jul 2013
Amount Awarded:	HK$56,000

4. Details of the Impact or Benefit

The health and medical needs of an ageing population mean Hong Kong has to store up increasing amounts of fresh blood products. In 2013 alone, the Hong Kong Red Cross Blood Transfusion Service (BTS) needed 3.4 per cent more units of whole blood, plasma and platelets than it collected in 2012, when demand increased by 4.4 per cent. Added to that growing demand is the fact that donations from first-time donors have fallen, in part because the revised school curriculum means Form 7 students are now spread out in universities and the workplace, rather than easily targeted in a school.

To find additional donors, the BTS has engaged Dr Chau and they have worked closely on this project since 2009. They focused on the determination of relationship between blood donors' residential addresses and their donation habits. They studied their decision making requirements, collected their data, and applied data mining techniques on the data. The results were analysed together with the data from the Census and Statistics Department of the HKSAR Government, and statistical models were developed to predict

which district would be the preferred site of a new blood donation center for the BTS. Based on the findings of the analysis, Dr Chau made a recommendation to the BTS on selecting Yuen Long as the best location to establish a new blood donation center. Following his recommendation, the BTS established a new center there in August 2011 and the outcome was overwhelming. The center attracted more than 400 donations per week and most of these donors came from the districts as predicted in Dr Chau's analysis model.

The Head of the BTS' Blood Collection and Donor Recruitment Department has made the following comments on the impact of Dr Chau's project:

> *"With his excellent analysis, a new blood donor center was established at Yuen Long Happy Plaza which opening was officiated by Dr York CN Chow, former Secretary of Food and Health, HKSAR government on 31 August 2011. On our follow up, the donation statistics closely followed Dr Chau's prediction. More than 88% of the donors are residing at the Yuen Long and neighbouring area. More importantly, by the end of the first year service, the number of donations (16,990) already exceeded the planned collection target of 15,000 by year 3 in the original proposal."*

> *"We greatly appreciate Michael's efforts in applying our service data, government information and his superb knowledge in helping us to develop model and prediction for new donor site selection. With ageing population and increasing blood demand, the BTS is facing significant challenge in maintaining adequate blood supply. Well planned and accurate selection of new fixed donation site are a must to our success in the health care system."*

> *"Without an expert, we are never able to present in a quantitative way to convince the stakeholders on the funding support of building up new donor center."*

The project is highly beneficial to the community as the new center allows the BTS to attract more donors and thus ensure the steady supply of blood in Hong Kong, which is vital to public health in the city. It is a good example of knowledge sharing with the community for building a practical model in health care service that has achieved the goal of saving more lives in a cost effective manner.

Dr Chau has received a grant from the Hong Kong Hospital Authority to do a multidimensional analysis of blood donation data in order to identify more useful patterns, which are expected to help the BTS in future planning of new sites to facilitate the public to donate blood.

5. References to the Corroboration of Impact or Benefit

- Statement of support from the Hong Kong Red Cross Blood Transfusion Service is available for corroboration purpose.

- Facebook page of the blood donation center opened in Yuen Long as a result of this project:
  https://www.facebook.com/pages/Yuen-Long-Donor-Center-%E5%85%83%E6%9C%97%E6%8D%90%E8%A1%80%E7%AB%99/101262546642756