BCloud App: Blood Donor Application forAndroid Mobile

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Abstract- Blood service operations are a key component of the healthcare system all over the world and yet the modeling and the analysis of such systems from a complete supply chain network optimization perspective have been lacking due to their associated unique challenges. To provide web based communication there are numbers of online web based blood bank management system exists for communicating between department of blood centers and hospitals, to satisfy blood necessity, to buy, sale and stock the blood, to give information about this blood. Manual systems as compared to Computer Based Information Systems are time consuming, laborious, and costly. This paper introduces the, BCloud Blood Donor Contact Manager Web Services allows you to maintain a free, easy-to- organize database of contacts and their blood groups. With this convenient—and potentially lifesaving--app, you can quickly check your Android device for someone with a certain blood type and contact them immediately.

Keywords – BCloud, Laborious, Supply Chain Network, Web Services.

I.INTRODUCTION

In today's world, supply chains are more complex than ever before. Consumers' demand for new products as well as the still critical economic situation requires that companies, as well as organizations, be more innovative while also becoming more cost-effective in the procurement and production of their products and services as well as in their delivery. How- ever, despite numerous significant achievements, the discipline of supply chain management(SCM) is still incapable of satisfactorily addressing many practical, real-world challenges. Supply chains for time-sensitive products and, in particular, for perishable products, pose specific and unique challenges. By definition, a perishable product has a limited lifetime during which it can be used, after which it should be discarded. Examples of perishable goods include food and food products, medicines and vaccines, cut flowers, etc.

Clearly, not all perishable products are alike and, notably, in some cases, such as that of medicines and vaccines, the quality of a product, or lack thereof, may result in a matter of "life or death" for its consumers. In this paper, we focus on a specific perishable product – that of human blood and the optimization of a blood banking network system. Nahmias (1982) claimed that: "The interest among researchers in perishable inventory problems has been sparked primarily by problems of blood bank management. Some of the possible reasons for this interest might be that blood bank research has been supported by public funds." Prastacos (1984), subsequently, provided a review, to that date, of blood inventory management, from both theoretical and practical perspectives. Whether or not Nahmias' statement is still valid considering all the recent concerns about the safety of perishable products, blood bank management from a supply chain network perspective merits a fresh and updated approach.

This topic is especially timely today, since it has been reported that the number of disasters and the number of people affected by disasters has been growing over the past decade and blood is certainly a life-saving product. Blood service operations are a key component of the healthcare system all over the world. According to the American Red Cross, over 39,000 donations are needed everyday in the United States, alone, and the blood supply is frequently reported to be just 2 days away from running out. Of 1,700 hospitals participating in a survey in 2007, a total of 492 reported cancellations of elective surgeries on one or more days due to blood shortages. While for many

hospitals, the reported number of blood related delays was not significant, hospitals with as many days of surgical delays as 50 or even 120 have been observed. Furthermore, in 2006, the national estimate for the number of units of whole blood and all components outdated by blood centers and hospitals was 1,276,000 out of 15,688,000 units. Considering also the ever-increasing hospital cost of a unit of red blood cells with a 6.4% increase from 2005 to 2007 further highlights the criticality of this perishable, life- saving product. In the US, this criticality has become more of an issue in the Northeastern and Southwestern states since this cost is meaningfully higher compared to that of the Southeastern and Central states. Moreover, hospitals were responsible for approximately 90% of the out dates, with this volume of medical waste imposing discarding costs to the already financially-stressed hospitals.
Several authors have applied integer optimization models such as facility location, set covering, allocation, and routing to address the optimization / design of supply chains of blood or other perishable critical products. In addition, inventory management methods , Markov models as well as simulation techniques have been used to handle blood banking systems. Yegul (2007), in his dissertation, which has extensive references on the subject of blood supply chains, also utilized simulation for a blood supply chain with a focus on Turkey. He noted that there were few studies which consider multiple echelons (as the model in our paper does). Haijema, van der Wal, and van Dijk (2007) used a Markov dynamic programming and simulation approach with data from a Dutch blood bank. In this paper, we develop a multicriteria system-optimization framework for a regionalized. In Cloud Computing Environment a Blood Donor Contact Manager Web Services (SaaS) allows you to maintain a list of contacts and their blood groups. You will have to register as a blood donor first before you can use this app. Blood Donor Contact Manager Web Services allows you to maintain a free, easy-to- organize database of contacts and their blood groups. With this convenient—and potentially lifesaving--app, you can quickly check your Android device for someone with a certain blood type and contact them immediately. When someone's in need of a blood transfusion, time and accurate information are absolutely crucial.

Blood Donor Contact Manager Web Services (SaaS) keeps all the basic information you need in one place, where you can easily look up a certain blood type and a donor's contact information. To create a new listing, simply touch the "Add Donor" button. You'll be prompted to enter an individual's name, phone number, and blood type. After you've entered this information, an alphabetical listing of all your contacts will appear on the main screen; you can customize the page to show only a certain blood type or to check the compatibility of certain people. In case of a blood requirement, you can quickly check for contacts matching a particular blood group and reach out to them via Call/SMS through the Blood donor App. Blood Donor App provides list of donors in your city/area. Use this app in case of emergency. You can also broadcast a requirement on your Facebook Account or Twitter. The application is suited for use by both personal users and Hospitals/Blood Donor groups that wish to maintain a list of blood donors. If there's an emergency and you see potential blood donors on your list, you can contact them quickly via text message or phone call. Unlike many other supply chain models that assume a fixed lifetime for a perishable good, our system-optimization approach for supply chain network management, as we shall demonstrate, captures the perishability/waste that occurs over the relevant links associated with various activities of the supply chain, similar to the spatial price equilibrium model in Nagurney and Aronson (1989).
However, in contrast to the latter model, here we also take into account the discarding cost of the waste over the relevant links as well as the discarding cost of outdated product at the demand points due to the possible excess supply delivered. Furthermore, we capture in the model the uncertainty of the demand and the associated shortage penalties at the demand points. System optimization models have been developed to capture various issues of supply chain management including that of mergers and acquisi- tion as well as network design. This paper is organized as follows. We develop the supply chain network model for the blood banking system problem, and establish that the multicriteria optimization problem is equivalent to a variational inequality problem, with nice features for computations. We also present simple numerical examples and conduct sensitivity analysis.

Our model has several novel features:
1. It captures perishability of this life-saving product through the use of arc multipliers;
2. It contains discarding costs associated with waste/disposal;
3. It handles uncertainty associated with demand points;
4. It assesses costs associated with shortages/surpluses at the demand points, and
5. It quantifies the supply-side risk
associated with procurement.

II.BLOOD DONORSHIP

Major headings are to be column centered in a bold font without underline. A donation is when a donor gives blood for storage at a blood bank for transfusion to an unknown recipient. These can occur at a number of locations including blood donation centers, mobile camps, mobile vans, etc. There a number of types of blood donations such as voluntary blood donation programme. This is the foundation for safe and quality blood transfusion service as the blood collection from voluntary non remunerated blood donors is considered to be the safest. In order to augment voluntary blood donation in developing countries like India[1] is based on well defined frameworks and operational guide for organizations for this important activity. International healthcare research bodies have extensive frameworks that address context of blood management[2]. In developed countries there are dedicated organizations that have effective blood donor management processes. One such example is the U.S. department of defense (DOD) , which uses an enterprise blood Management software that will manage the blood supply chain including donor management, blood collections, testing, distribution and transfusion. Additionally this also provides a proactive delivery of information and service through a web portal[3].

2.1 Relevant Peer Research-

Santhanam et al[4][5] extended the nominal definition based on a standard dataset to derive a CART[6] based decision tree model based on standard donorship. This analysis helped identify the attributes that classify a regular voluntary donor (RVD) in the context of a standard dataset. This provided an extended RVD definition based on the donor definition (along with the application of CART) provides a standard model to determine the donor behavior and provides the capability to build a classification model. This additional nominal class can be easily computed based on the statistical definitions and help assist in decision making. Chau et al[7] have extensively analyzed the linkages related to the blood donation to the location of the blood donation centers.
This research was carried out using donor's past donation profiles to help setup a new blood donation center for the Hong Kong Red Cross.Their findings provide correlations between spatial distance and the incentive for the blood donors which is the uniqueness of this research. This specifically helps in the effective setup of centers with maximal donorship potential. Saberton et al[8] have extensively analyzed the linkages related to the blood donation to the location of the blood donation centers.Their findings provide correlations between spatial distance and the incentive for the blood donors. This specifically helps in the effective setup of centers with maximal donorship potential. Bing et al[9] have extensively analyzed the working and implementation of blood bank information systems. Their research provides an extensive background of blood bank information systems. The research also talks about the importance of the decision making capability that is required for effectively running the operations in blood banks. The research also identifies various critical areas that are required for the systems to also have in order to enable decision making.

III.ANALYSIS

3.1 About the Dataset

The blood transfusion dataset is based on donor database of Blood Transfusion Service Center in Hsin-Chu City in Taiwan. The center passes their blood transfusion service bus to one university in Hsin-Chu City to gather blood donated about every three months. This dataset is derived from I- Cheng Yeh[11]. The data set consists of 748 donors at random from the donor database.

Table -1:Revised RVD Confusion Matrix

	TP Rate	FP Rate	Precision	Recall	FMeasure	ROC Area
Class 0 (not RVD)	0.92	0	1	0.92	0.96	0.96
Class 1 (RVD)	1	0.08	1	1	1	0.96
Weighted Avg.	1	0.08	1	1	1	0.96

These 748 donor data, each one included R (Recency - months since last donation), F (Frequency - total number of donation), M (Monetary - total blood donated in c.c.), T (Time – months since first donation), and a binary variable representing whether he/she donated blood in March 2007 (1 stand for donating blood; 0 stands for not donating blood). There is an imbalance in that the people who have donated blood in 2007 accounts for only 24% in the dataset. This dataset has been extended to accommodate the following attributes. Additionally a geo-location information was added in the syntax of latitude: longitude. This was randomly assigned to locations in India for analysis. Please note the data used is to be considered only for demonstrative purposes.

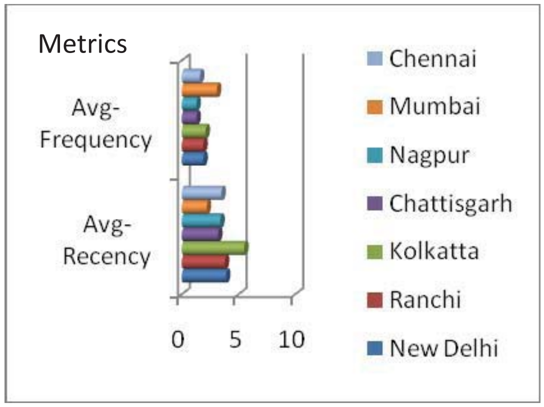
3.2 Analysis

The ability to easily compute this based on statistical and definition data provided by frameworks[1]. additional nominal class can be easily computed based on the definition. The results of the decision tree help refractor the definitions of the RVD with the following offsets. These have had been defined using suggestive definitions[5]. The dataset is now corrected to these offsets and used for this analysis.
IF ((Frequency > 18.5 (times) AND Recency < 8.5 (months))
RVD = TRUE ELSE
RVD = FALSE
This results in a finer refinement to the RVD model.
The RVD confusion matrix(using the tool weka[12]) post this is provided in the following table.

Table -2:Previous RVD Confusion Matrix

	TP Rate	FP Rate	Precision	Recall	FMeasure	ROC Area
Class 0 (not RVD)	0.92	0	1	0.92	0.96	0.96
Class 1 (RVD)	1	0.08	1	1	1	0.96
Weighted Avg.	1	0.08	1	1	1	0.96

The comparison between the RVD before the offset and with it indicate an overall stability to the model with delta change to a better true positive rate for a non RVD and also small increase in the FP rate the non RVD. The inclusion of geospatial location along with the donor data provides critical indicative identification of the RVD. This allows the capability to search by geo locational attributes which enables targeted blood donation program management including aspects related to logistics and infrastructure linkages. Additional linking to census and demographic information[8] allows the effective determination of blood donor profiles with capabilities to drill-down to the appropriate levels. Please note the this analysis has been developed using random geo-locational values (dummy values) which have helped to provide a meaningful endpoint of this analysis.



Value(Freq-count,Recency-Months)

Figure-2 Freq-count, Recency-Months

This is further analyzed by a perspective at the overall dashboard across the the indicators and ranking the locations by scores. The algorithm for the das indicated as follows.

Geo-location RVD Scoring Algorithm

Step 1: Loop through each unique location L (latitude, longitude) based on geographic division (such as state, district and city).

Step 2: For each location L compute the average frequency, average recency and total RVD count.

Step 3: Calculation of Location level summary scores for the recency, frequency and RVD across the locations.

The RecencyScore (location) is computed as the Rank in descending.
The FrequencyScore (location) is as the Rank in ascending.
The RVDScore (location) is computed as the Rank in ascending.

Step 4: Plot the this score in the chart with scores on the X – Axis locations on the Y.

The results in comparison with the earlier model [5] reveal an improvement in the true positive rate for RVD class along with a delta increase in the false positive rate.

IV.CONCLUSIONS

In Cloud Computing Environment a Blood Donor Contact Manager Web Services (SaaS) allows you to maintain a list of contacts and their blood groups. You will have to register as a blood donor first before you can use this app. Blood Donor Contact Manager Web Services allows you to maintain a free, easy-to-organize database of contacts and their blood groups. With this convenient--and potentially lifesaving you can quickly check your Android device for someone with a certain blood type and contact them immediately. When someone's in need of a blood transfusion, time and accurate information are absolutely crucial. Blood Donor Contact Manager Web Services (SaaS) keeps all the basic information you need in one place, where you can easily look up a certain blood type and a donor's contact information. To create a new listing, simply touch the "Add Donor" button. You'll be prompted to enter an individual's name, phone number, and blood type. After you've entered this information, an alphabetical listing of all your contacts will appear on the main screen; you can customize the page to show only a certain blood type or to check the compatibility of certain people. In case of a blood requirement, you can quickly check for contacts matching a particular blood group and reach out to them via Call/SMS through the Blood donor App. Blood Donor App provides list of donors in your city/area.
Use this app in case of emergency. You can also broadcast a requirement on your Facebook Account or Twitter. The application is suited for use by both personal users and Hospitals/Blood Donor groups that wish to maintain a list of blood donors. If there's an emergency and you see potential blood donors on your list, you can contact them quickly

via text message or phone call. The dashboard indicated in figure 2 provide a quick and relevant score of the the geographic locations based on the RVD profile key indicators. The geo-location RVD scoring algorithm can be modified to rollup to additional attributes as well as handle the requisite geographic division strategy. This capability enables this to be linked effectively to the census tracts as well as health profile systems that enable drill-down to finite levels of information for effective blood donor management. This paper provides a complimentary capability to the recent research. The application of this across a larger dataset and linkage to both demographic and census tracts will enable the ability to identify. meaningful patterns of blood donorship that will assist in the better management.

This provide critical decision makers the ability to make planned decisions. This demonstrates a viable mechanism to manage blood donorship. In specific this helps address the optimized deployment of budget resources related to blood donations drives. This also assists policy makers plan the required budget allocation for overall blood donation related activities in a addressing targeted goals. Such techniques assist in the decision support for healthcare organizations. Future work will be focused on further enhancing these models to allow integration with blood donor management systems including innovative ways of visualization. The current implementation of the RVD model can also be implemented with other relevant attributes. Similar strategies can also be adopted for other healthcare domains.

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