Fraud Detection in China Health Care with HT Analytics

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Albert Ma, Chief Innovation Officer

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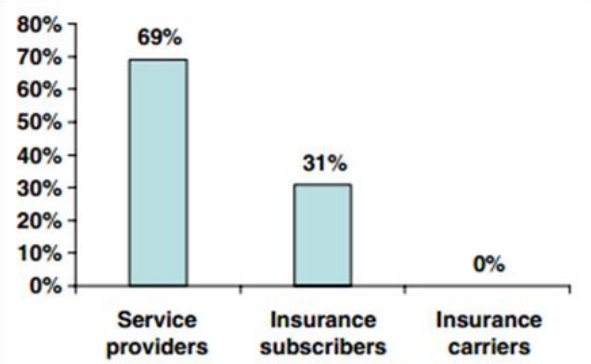
Fraudulent and abusive behavior in health insurance is a major problem which covers a wide range of activities in terms of cost and sophistication. In Mainland China, the government sponsors health insurance systems with a public institution also regulating the health insurance market. However, fraud and abuse in medical claims have become an important concern in health insurance due to the increasing losses in revenues and lack of effective supervising methods.

Client A is a leading record keeping service provider of medical insurance and social security in Mainland China. With multiple years of records and huge data sets on medical insurance, Client A has turned to Hengtian for its big data analytics service.

There are three major data sources of health care fraud. They are a) service providers, including doctors, hospitals, ambulance service companies, and medical laboratories; b) insurance subscribers, including patients and patients' employers; and c) insurance carriers, who receive regular premiums from their subscribers and pay health care costs on behalf of their subscribers, including governmental health departments and private Insurance companies.



In recent years, a large number of automated systems have been implemented to perform audits and reviews of claims data. These systems are designed to identify areas requiring special attention such as incorrect and incomplete data input, duplicate claims and inconsistent data input etc. Although these systems may be used to detect certain types of fraud, their fraud detection capabilities are usually limited since detection mainly relies on pre-defined simple rules specified by domain experts.

HT Analytics' sophisticated antifraud engine incorporates a wide range of statistical methods for effective fraud detection. The major advantages of the system include: 1) automatic learning of fraud detection from data patterns; 2) specification of "fraud likelihood" for each case, so that efforts for investigating suspicious cases can be

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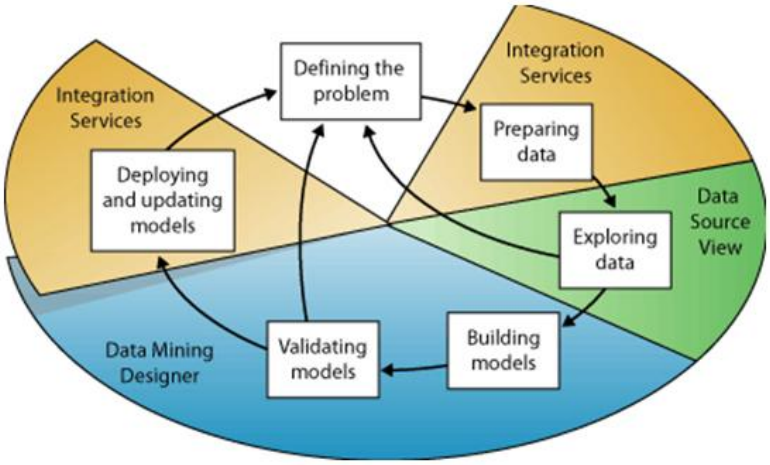
prioritized; 3) identification of new types of fraud which were not previously existing rules. HT Analytics mines the large amounts of historic data, detects outlier patterns and continuously trains the analytic model, so that any new record set can be predicted whether it's an outlier. The model training procedure is illustrated in the figure below.

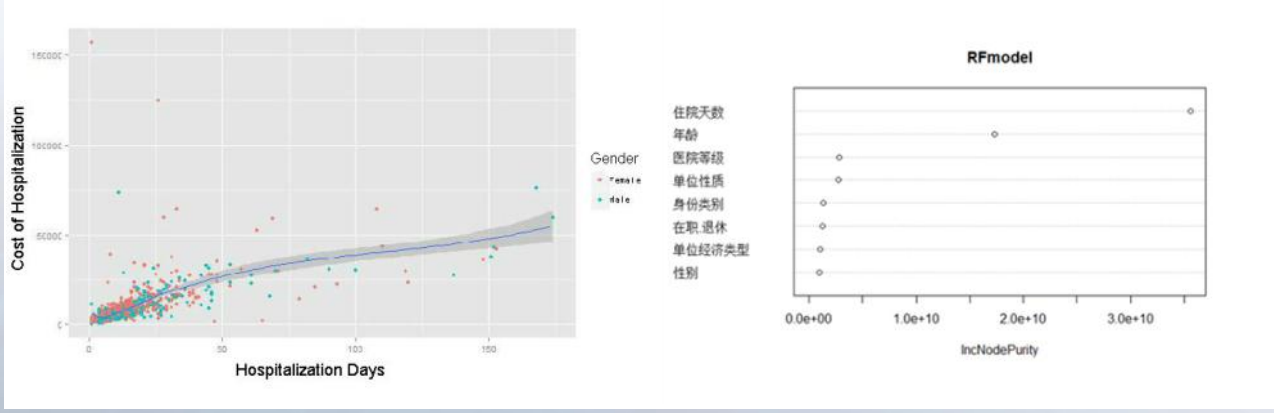


In Client A's case, it is known that the effectiveness of a statistical fraud detection method is affected by the extent to which the unique characteristic of health care data conform to the inherent assumptions of this method. HT Analytics provides a global view across each fraud detection method and segregates them into several sub-domains.

1 Medical treatment behavior analysis. Conclude the pattern of pathogenetic and prescription of treating regularity.

2 Time-series analysis for hospital department. Detect the abnormal contextual outlier in time series data.

3 Regression model for total expense and length of stay. Consider the important factor related to expense or stay. As the figure below shows the regression model with its confidence interval and a factor importance plot.



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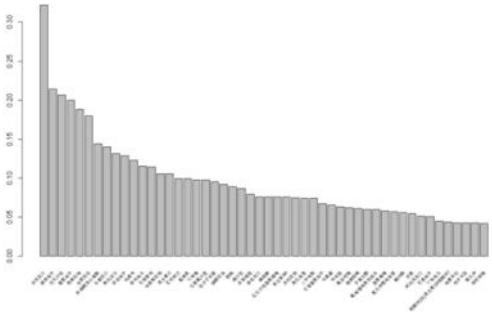
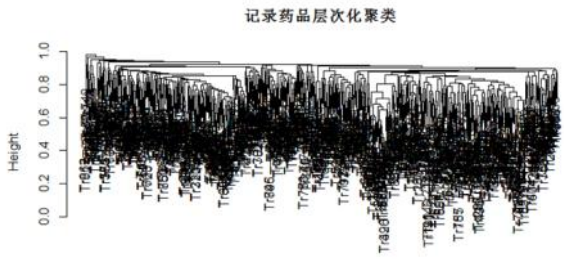
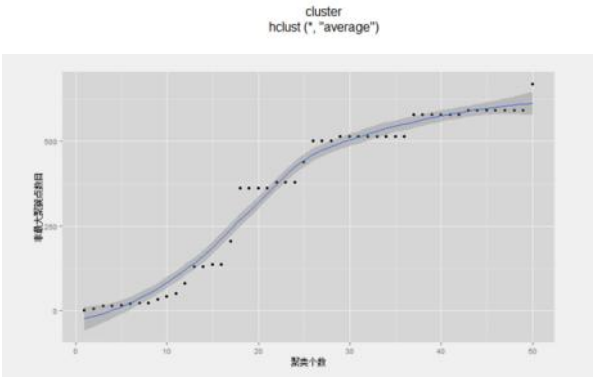
4 Frequent Item Mining with medications. Detect the abnormal medicator.

items	support	
{厄贝沙坦	辛伐他汀}	0.075936
{硝苯地平	辛伐他汀}	0.073797
{奥美拉唑	辛伐他汀}	0.069519
{维生素B6	维生素C}	0.064171
{单硝酸异山梨酯	辛伐他汀}	0.058824
{辛伐他汀	长春西汀}	0.057754
{前列地尔	辛伐他汀}	0.055615
{单硝酸异山梨酯	呋塞米}	0.055615
{辛伐他汀	自费西药}	0.055615
{氨氯地平	辛伐他汀}	0.051337



5 Clustering Analysis for the patient, hospital and therapies. Conclude their group characteristic and the change with time.





All these are integrated into a workflow within HT Analytics to provide a comprehensive business solution.

HT Analytics is a cloud based, on-demand, plug-and-play and big data ready engine that can adapt multiple kinds of analytic calculation. For more detailed product information, please contact info@hengtianservices.com (US office) or services@hengtiansoft.com (China headquarters).

About Hengtian

Insigma Hengtian Software Ltd. is a technology services company located in Hangzhou, China. It originated as an alliance among State Street Corporation, Insigma Technology (a Global Outsourcing 100 Company) and Zhejiang University. Hengtian provides offshore and onshore technology development, research and consulting services. It has established long-term, trusted relationships with clients in six countries. Among our clients are industry giants such as State Street, DST, Cisco, Honda, Alibaba, and The China Foreign Exchange Trade System. For more information about Hengtian, visit www.hengtiansoft.com.