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| ***Abstract*—Fraud is widespread and very costly to the health-** | | | | |  | • Upcoding of services: Billing insurance company for | | | | | | |
| **care insurance system. Fraud involves intentional deception or** | | | | | services that are costlier than the actual procedure that | | | | | | |
| **misrepresentation intended to result in an unauthorized benefit.** | | | | | was done. Example: 45-minute session being billed as | | | | | | |
| **It is shocking because the incidence of health insurance fraud** | | | | | 60-minute session | | | | | | |
| **keeps increasing every year. In order to detect and avoid the** | | | | | • Upcoding of items: Billing insurance company for | | | | | | |
| **fraud, data mining techniques are applied. This includes some** | | | | |
| **preliminary knowledge of health care system and its fraudulent** | | | | | medical equipment that is costlier than the actual | | | | | | |
| **behaviors, analysis of the characteristics of health care insurance** | | | | | equipment. Example: Billing for power assisted | | | | | | |
| **data. Data mining which is divided into two learning techniques** | | | | | wheelchair while giving the patient only the manual | | | | | | |
| **viz., supervised and unsupervised is employed to detect** | | | | | wheelchair. | | | | | | |
| **fraudulent claims. But, since each of the above techniques has its** | | | | | • Duplicate claims: Not submitting exactly the same bill, | | | | | | |
| **own set of advantages and disadvantages, by combining the**  **advantages of both the techniques, a novel hybrid approach for** | | | | |
| but changing some small portion like the date in order | | | | | | |
| **detecting fraudulent claims in health insurance industry is** | | | | | to charge insurance company twice for the same | | | | | | |
| **proposed.** | | | | | service rendered. Example: An exact copy of the | | | | | | |
| ***Keywords—data*** | ***mining;*** | ***health*** | ***insurance*** | ***fraud;*** | original claim is not filed for the second time, but | | | | | | |
| rather some portion like date is changed to get the | | | | | | |
| ***supervised; unsupervised*** | | | | | benefit twice the original. | | | | | | |
| I. INTRODUCTION | | | | | • Unnecessary services: Filing claims which in no way | | | | | | |
| apply to the condition of a patient. Example: Patient | | | | | | |
| Deliberately deceiving the health insurance company that | | | | | with no symptoms of diabetes filing claim for daily | | | | | | |
| results in healthcare benefits being paid illegitimately to an | | | | | usage of insulin injections. | | | | | | |
| individual or group is known as health insurance fraud. The | | | | | II. DATA MINING | | | | | | |
| main purpose of fraud is financial benefit. According to a | | | | |
| recent survey, it is estimated that the number of false claims in | | | | |
| Nowadays there is huge amount of data stored in real- | | | | | | |
| the industry is approximately 15 per cent of total claims. | | | | |
| world databases and this amount continues to grow fast. So, | | | | | | |
| Insurance companies in USA incur losses over 30 billion USD | | | | |
| there is a need for semi-automatic methods that discover the | | | | | | |
| annually to healthcare insurance frauds. The statistics is | | | | |
| hidden | knowledge | in | such | database. | Data | mining |
| appalling in developing country like India as well. The report | | | | |
| automatically filtering through immense amounts of data to | | | | | | |
| suggests that the healthcare industry in India is losing | | | | |
| find known/unknown patterns, bring out valuable new | | | | | | |
| approximately Rs 600-Rs 800 crores incurred on fraudulent | | | | |
| perceptions and make predictions. | | | | | | |
| claims annually [1]. Frauds blow a hole in the insurance | | | | |
| industry. Health insurance is a bleeding sector with very high | | | | | Data mining techniques tend to learn models from data. | | | | | | |
| claims ratio. So, to make health insurance industry free from | | | | | There are two approaches on learning the data mining models. | | | | | | |
| fraud, it is necessary to focus on elimination or minimization | | | | | Those are supervised learning, unsupervised learning; and | | | | | | |
| of fake claims arriving through health insurance. | | | | | they are described below: | | | | | | |
| The health insurance fraud claims are broadly classified | | | | | *A. Supervised Learning:* | | | | | | |
| under the following headings: | | | | |
| • Billing for services not rendered: Billing insurance | | | | | This is the most usual learning technique wherein the | | | | | | |
| model is trained using pre-defined class labels. In the context | | | | | | |
| company for things that never happened. Example: | | | | |
| of health insurance fraud detection the class labels may be the | | | | | | |
| Forging the signature of those involved in giving bills. | | | | |
| “legitimate” and “fraudulent” claims. The training dataset can | | | | | | |

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