

MITIGATING FRAUD IN THE HEALTH INSURANCE INDUSTRY: METHODS AND IMPACT

Presented By : Dr. Akhil Soni

Roll No. 1670

MBA- Hospital and Health Management

Faculty Mentor : Dr. Anoop Khanna

OVERVIEW



- Introduction
- Aim
- Research Question
- Objective
- Methodology
- Result
- Recommendations
- Conclusion
- References

INTRODUCTION

- Health insurance plays a crucial role in offering financial protection and ensuring access to timely, quality healthcare services.
- With the growth of healthcare and insurance sectors, fraud has emerged as a major concern, involving false claims, inflated billing, and provider-patient collusion.
- The rise in digitalization has made fraud more sophisticated, rendering traditional detection methods like manual audits and random checks less effective.
- Health insurance fraud leads to significant financial losses globally, resulting in higher premiums and reduced trust in the system.
- Advanced technologies like data analytics, machine learning, and blockchain offer promising solutions for identifying and preventing fraud.
- Behavioral and ethical factors such as economic stress, weak enforcement, and poor internal controls also drive fraudulent activities.
- This study explores existing and emerging fraud detection methods, evaluates their effectiveness, and offers recommendations for a stronger, fraud-resilient insurance framework.

AIM

To evaluate existing fraud detection methods in health insurance using secondary data, and assess the effectiveness of technologies and organizational factors in reducing fraud and enhancing system efficiency.



RESEARCH QUESTION

- What are the most effective methods for mitigating fraud in the health insurance industry?
- How do they impact financial outcomes, operational efficiency, and stakeholder trust?

OBJECTIVE



- Evaluate traditional and modern fraud detection techniques in health insurance.
- Analyze the financial and operational impact of fraud on insurers and policyholders.
- Assess the effectiveness of emerging technologies like AI, ML, and blockchain in fraud prevention.
- Recommend strategic improvements in fraud detection through tech and best practices.

METHODOLOGY

- Research Design: Descriptive Study
- Research Approach: Quantitative secondary data
- Sample Size : 10 Articles
- Sampling Technique : Purposive Sampling

Identification

55 records identified through databases (PubMed, Scopus, Google Scholar)

Screening

55 titles and abstracts screened; 25 excluded as not relevant

Eligibility

30 full-text articles assessed for eligibility

Exclusion

20 articles excluded (8 non-Indian context, 7 low-quality data, 5 outside publication window)

Included

10 studies included in the final review

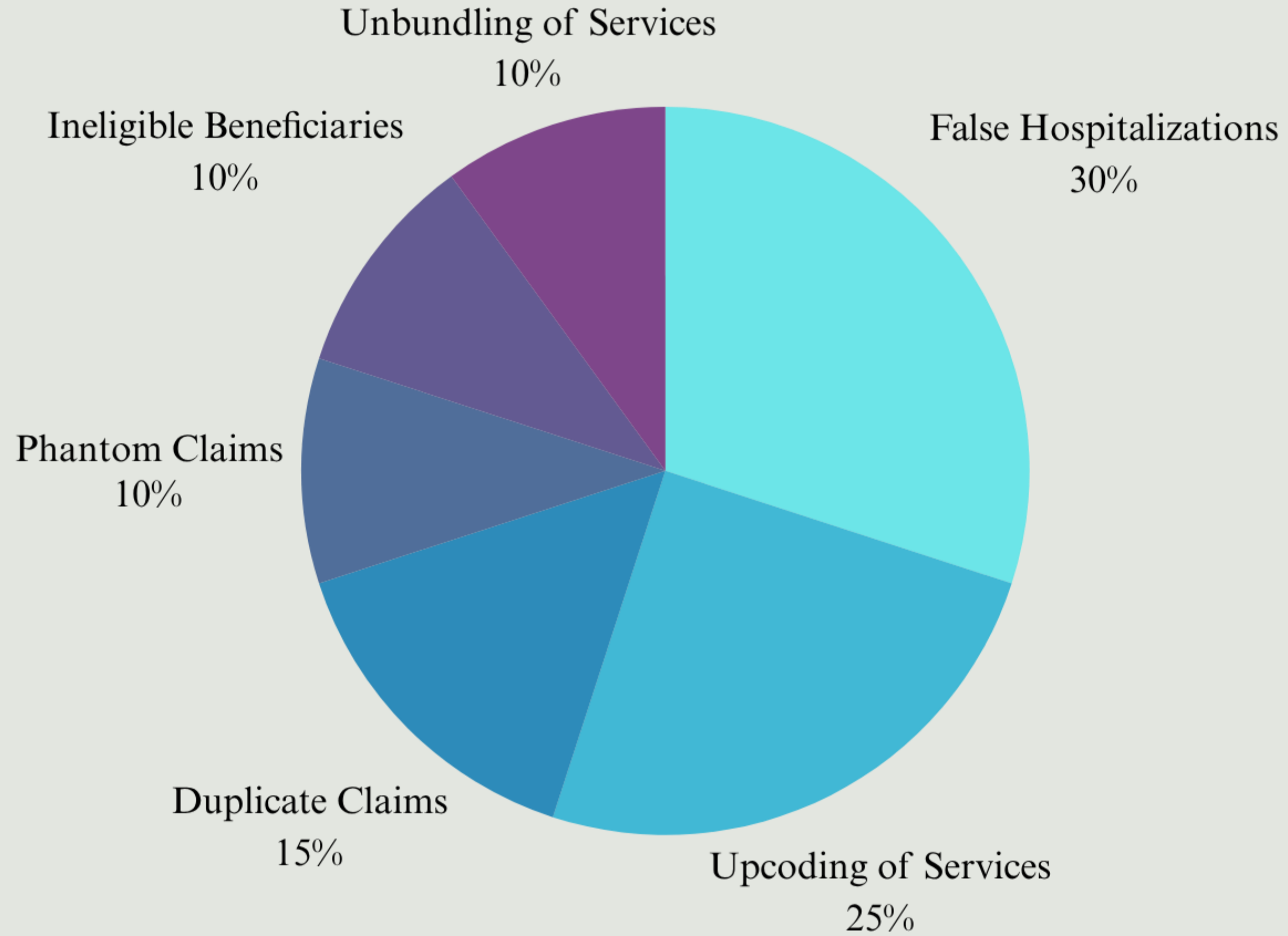
RESULT

Types Of Fraud In Health Insurance

False Hospitalizations	High	As reported by Gupta et al. (2021), this involved fake or medically unnecessary hospital admissions, which spiked during COVID-19. These often involve collusion between hospitals and patients.
Upcoding of Services	High	Overbilling by assigning more expensive treatment codes than actually performed, a practice tackled using ANN and ensemble models (Peddireddy et al., 2025; Mohanta & Panigrahi, 2023).
Phantom Claims	Low	Claims for nonexistent patients/services. Blockchain-based approaches by Saldamli & Vamshi (2025) proposed immutable ledgers to combat this.
Ineligible Beneficiaries	Moderate	Submitting claims for lapsed policyholders, as noted during the pandemic (Gupta et al., 2021).
Duplicate Claims	Moderate	Identified by Shamitha (2025), these involve multiple submissions of the same claim to different insurers.

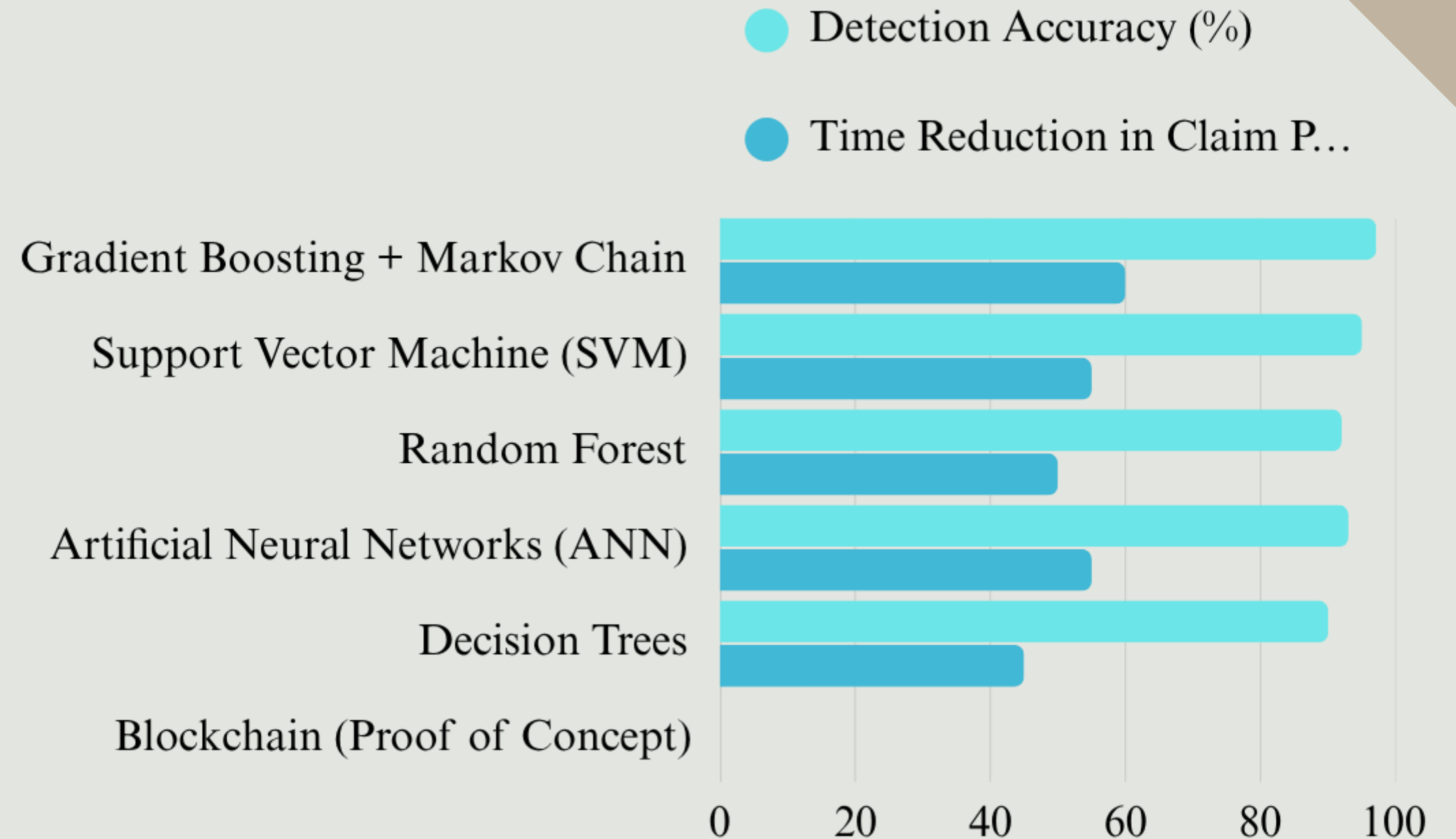
RESULT

Types of Fraud across the studies



RESULT

- Gradient Boosting + Markov Chain shows the highest performance with 97.1% accuracy and 60% time reduction, making it the most effective technique.
- SVM (95%) and ANN (93%) also offer high accuracy with 55% time savings each.
- Random Forest and Decision Trees deliver good accuracy (92% and 90%) with moderate time savings.
- Blockchain is still in proof-of-concept stage with no measurable impact on accuracy or time reduction.



Accuracy & time reduction due to fraud detection techniques

RECCOMENDATION

- **Adopt Hybrid AI Models:** Use AI systems combining rule-based and statistical methods; retrain regularly to adapt to new fraud patterns.
- **Improve Data Quality:** Enforce standardized data cleaning, normalization, and feature selection protocols to enhance model accuracy.
- **Create Centralized Fraud Database:** Establish a government-regulated, anonymized platform for shared access to suspicious claims across insurers.
- **Pilot Blockchain for Claims :**Test blockchain to secure claim history, reduce fraud, and improve transparency in provider payments.
- **Target Tier-2/3 Regions :** Deploy region-specific anti-fraud strategies, hospital staff training, and beneficiary awareness drives.
- **Standardize Policy Documentation :** Align billing codes, templates, and audit SOPs to close systemic loopholes and ensure consistency.
- **Implement Real-Time Monitoring & XAI :** Use live dashboards for fraud detection and integrate Explainable AI to ensure transparency and accountability.

CONCLUSION

- Common fraud types in India include false hospitalization, upcoding, duplicate billing, phantom claims, and use by ineligible beneficiaries — often involving collusion between patients and provider
- Hybrid AI models (rule-based + machine learning) outperformed standalone algorithms in accuracy, adaptability, and reducing false positives.
- High-quality data preprocessing and automated detection systems significantly improved fraud detection efficiency.
- Higher fraud rates were observed in Tier-2 and Tier-3 cities, linked to lower digital adoption and insurance literacy.
- Emerging technologies like blockchain show future promise for transparent, tamper-proof claim processing in India.

REFERENCE



- Gupta RY, Mudigonda SS, Baruah PK, Kandala PK. Markov model with machine learning integration for fraud detection in health insurance. arXiv preprint arXiv:2102.10978. 2021. Available from: <https://arxiv.org/abs/2102.10978>
- Aarati K, Shirisha A, Bindhu K. Comparative analysis of machine learning algorithms in health insurance fraud detection. Journal of Scientific and Technological Research. 2023;12(1). Available from: <https://jst.org.in/index.php/pub/article/view/896>
- Rawte V, Srinivas A. A hybrid model for fraud detection in health insurance claims. In: 2015 International Conference on Communication, Information & Computing Technology (ICCICT). IEEE; 2015. p. 1-5. Available from: <https://ieeexplore.ieee.org/document/7045689>
- Pai DD, Agnihotri P, Rajath GR, Jha BK. Applications of data mining in detecting fraudulent health insurance claim. International Journal of Engineering Research & Technology (IJERT). 2016;4(22). Available from: <https://www.ijert.org/applications-of-data-mining-in-detecting-fraudulent-health-insurance-claim>
- Gupta RY, Mudigonda SS, Baruah PK, Kandala PK. Implementation of correlation and regression models for health insurance fraud in COVID-19 environment using actuarial and data science techniques. arXiv preprint arXiv:2102.04210. 2021. Available from: <https://arxiv.org/abs/2102.04210>

REFERENCE



- Peddireddy B, Reddy PVRK, Kapardi BS. Health insurance claim fraud detection using artificial neural networks. In: Proceedings of the Third International Conference on Cognitive and Intelligent Computing, Volume 2. Springer; 2025. p. 133–142.
- Waghade SS, Karandikar AM. Fraudulent detection in healthcare insurance. In: Proceedings of the International Conference on Sustainable Expert Systems. Springer; 2020. p. 1–10.
- Shamitha SK. A time-efficient model for detecting fraudulent health insurance claims using artificial neural networks. In: Proceedings of the Third International Conference on Cognitive and Intelligent Computing, Volume 2. Springer; 2025. p. 143–152.
- Saldamli G, Vamshi R. Health care insurance fraud detection using blockchain. In: Proceedings of the Third International Conference on Cognitive and Intelligent Computing, Volume 2. Springer; 2025. p. 153–162.
- Mohanta A, Panigrahi S. Health insurance fraud detection using feature selection and ensemble machine learning techniques. In: Proceedings of the International Conference on Intelligent Computing and Communication. Springer; 2023. p. 197–206.



Thank You