Executive Summary

Background

Fraudulent claims are driving up costs of claims and also resulting in slower processing time for legitimate claims. Due to the increased cost of claims, this results in higher premiums for our customers, reducing our market competitiveness. How can we better filter out fraudulent claims and reduce premium costs for our customers?

Recommendations

To tackle these challenges, we propose a three-pronged approach:
1. Integrate a predictive fraud detection model into the claims review process to proactively identify suspicious claims.
2. Deploy an automated tool to streamline claims processing, reducing errors and accelerating turnaround times.
3. Revamp and simplify the claims process to enhance transparency and ease of use for customers.

Impact

Implementing these strategies is expected to yield significant benefits:
1. Anticipated 96% decrease in fraudulent claim payouts, resulting in substantial cost savings.
2. Projected 50% reduction in claims processing time, enhancing operational efficiency and customer satisfaction.
3. Estimated 14% decrease in customer premiums, bolstering market competitiveness and attracting new business opportunities.

Next Steps

To ensure sustained success, we recommend the following actions:
1. Continuously train and supervise the fraud detection model to adapt to evolving fraud patterns.
2. Adapt and optimise the automated tool to meet changing business requirements.
3. Regularly engage with customers to refine the claims process and prioritise transparency.

Project Charter

Project Name	Health Insurance Fraud Reduction
Objectives	1. Implement automated claim review processes to better identify legitimate and fraudulent claims, thereby expediting claims processing.
	2. Enhance fraud detection methodologies to more effectively identify fraudulent claims, leading to reduced premiums for consumers.
In Scope	1. Automate claims review processes.
	2. Simplify claims processing.
	3. Develop predictive fraud detection methods/models.
Out of Scope	1. Redesign claims submission user interface.
	2. Review pricing strategy for product premiums.
	3. Investigate identified potential fraudulent claims.
Deliverables	1. New automation tool for processing claims submissions and reviews, integrating with internal databases as required.
	2. Development and deployment of predictive fraud detection methods/models.
	3. Implementation of targeted interventions to decrease fraudulent claims.
Schedule/ Milestones	Week 1: • Define objectives, identify stakeholders, and acquire access to essential data sources. • Collect and clean necessary claims data.
	Week 2: • Conduct exploratory data analysis and validate hypotheses. • Deliver new automation tools and predictive fraud detection models.
Costs/ Resources	1. Project Manager: 40 hours per week • Overseeing the entirety of the project. • Facilitating communication among team members. • Managing project timelines and budgets • Ensuring successful project outcomes.

	2.	Data Scientist: 30 hours per week ● Analysing trends and patterns Developing algorithms/models for fraud detection.
	3.	Health Insurance Product Manager: 20 hours per week ● Supervising the alignment of the project with insurance product requirements.
	4.	Claims Manager: 25 hours per week ● Offering insights into existing fraud detection methods within the claims processing system.

	5.	Product Line Managing Director: 20 hours per week
		   ● Providing strategic direction.
		   ● Ensuring project alignment with overall business goals.
		   ● Making high-level decisions concerning resource allocation and project priorities.

Assumptions	1.	Claims data is accurate and complete.
	2.	Timeline and resources allocated are sufficient to complete the project and deliver all deliverables.
	3.	Implementation of the new automated tool and fraud detection model will enhance the claims experience and lead to reduced premiums, making them competitive in pricing.
	4.	Stakeholders are fully committed to implementing the recommendations derived from the project.

Risk Plan	Risk 1:
	   ● Customers affected by changes made to the claims process.
	
	Mitigation:
	   ● Work with the claims team to implement necessary workflow changes.
	   ● Communicate temporary expected downtime to customers.
	   ● Provide a step-by-step claims submission guide.
	   ● Apply the new claims process to a small percent of claims for testing.	

	Risk 2: ● Automated fraud detection models may not be as robust as manual fraud checks.	

	Mitigation: ● Implement data validation and quality assurance measures. ● Conduct small group testing for continuous improvement. ● Ensure human-aided supervision during initial implementation. ● Incorporate latest trends and information into the model.
	Risk 3: ● Data security and privacy breaches. **Mitigation:** ● Implement best practices for data security and adhere to robust data security measures. ● Regularly audit and update security protocols to stay ahead of potential threats.
	Risk 4: ● Potential disruption to business as usual (BAU) processes due to automation tool breakdown or upgrade, leading to longer claims processing times and customer dissatisfaction. **Mitigation:** ● Ensure employees are trained to work alongside the automation tool and kept updated on claims processes. ● Schedule software updates during low activity hours. ● Establish contingency plans for manual processing.
	Risk 5: ● Stakeholder disagreement. **Mitigation:** ● Facilitate regular stakeholder meetings to clarify project objectives, and address any concerns or disagreements promptly through open communication and negotiation. ● Provide clear communication channels for feedback. ● Engage stakeholders in decision-making.
	Risk 6: ● Insufficient resources and time for completion of the project. **Mitigation:** ● Conduct periodic resource assessments. ● Adjust resource allocation as necessary to meet project deadlines. ● Communicate with stakeholders about potential delays.

Team	1.	Andrew, Project Manager
	2.	Nelson, Data Scientist
	3.	Stella, Health Insurance Product Manager
	4.	Dan, Claims Manager
	5.	Trina, Product Line Managing Director
Approval	Prepared by: Andrew Reviewed by: Trina Approval Date: 12 March 2024	

Project Plan

Phase 1: Initiate *(days 1-2)*	
1.	Define project objectives, scope, and deliverables.
2.	Identify project stakeholders and establish communication, execution, and work plan.
3.	Form a project team and assign roles.
4.	Obtain project approval.
Phase 2: Plan *(days 3-4)*	
1.	Develop a detailed project plan and schedule.
2.	Define quality criteria and compliance standards.
3.	Establish a risk management plan.
4.	Concoct preliminary hypotheses for fraud detection.
5.	Design claims processing automation tools.
Phase 3: Execute *(days 5-8)*	
1.	Develop a fraud detection model based on exploratory data analysis (EDA) of available data.
2.	Test and fine-tune fraud detection model.
3.	Develop and implement tools for automating claims processing.
4.	Conduct training sessions for employees on fraud detection and automation tools.
Phase 4: Close *(days 9-10)*	
1.	Collect and evaluate feedback from stakeholders and users.
2.	Evaluate performance of fraud detection tools using small subset sampling.
3.	Evaluate performance of automated claims processing tools through analysis of claims processing time and user feedback.
4.	Develop recommendations for key intervention areas and prepare a project closure report.
5.	Conduct a project closure meeting to formally close the project and hand it over to relevant stakeholders for further action.

Risk Plan

Risk	Probability (H/M/L)	Impact (H/M/L)	Impact Description	Owner	Mitigation Action
Customers affected by changes made to the claims process.	M	H	Customers may experience delays in claims processing, leading to dissatisfaction, affecting the company's reputation.	Claims Manager	- Work with the claims team to implement necessary workflow changes. - Communicate temporary expected downtime to customers. - Provide a step-by-step claims submission guide. - Apply the new claims process to a small percent of claims for testing.
Automated fraud detection models may not be as robust as manual fraud checks.	M	H	Missed fraudulent claims could result in reduced profits and increased premiums for customers.	Data Scientist	- Implement data validation and quality assurance measures. - Conduct small group testing for continuous improvement. - Ensure human-aided supervision during initial implementation. - Incorporate latest trends and information into the model.
Data security and privacy breaches.	L	H	Data breaches could lead to legal liabilities, reputational damage, and loss of customer trust.	Data Scientist	- Implement best practices for data security and adhere to robust data security measures. - Regularly audit and update security protocols to stay ahead of potential threats.

Risk	Probability (H/M/L)	Impact (H/M/L)	Impact Description	Owner	Mitigation Action
Potential disruption to Business-As-Usual (BAU) processes.	L	M	Disruptions may lead to customer dissatisfaction and decreased operational efficiency.	Claims Manager	• Ensure employees are trained to work alongside the automation tool and kept updated on claims processes. • Schedule software updates during low activity hours. • Establish contingency plans for manual processing.
Stakeholder disagreement.	M	L	Disagreements may impede project progress, and damage company reputation and relationships.	Project Manager	• Facilitate regular stakeholder meetings to clarify project objectives, and address any concerns or disagreements promptly through open communication and negotiation. • Provide clear communication channels for feedback. • Engage stakeholders in decision-making.
Insufficient resources and time for project completion.	L	L	Resource constraints may cause delays in fraud reduction efforts.	Project Manager	• Conduct periodic resource assessments. • Adjust resource allocation as necessary to meet project deadlines. • Communicate with stakeholders about potential delays.

Project Review

Project Name:	Health Insurance Fraud Reduction	**Completion Date:**	24 March 2024

Executive Summary:	Fraudulent claims inflate costs and cause delays in processing legitimate claims, leading to higher customer premiums and diminished market competitiveness. To address this, we propose integrating a predictive fraud detection tool and deploying an automated tool to revamp the claims process. These measures are expected to decrease fraudulent claim payouts by 96%, reduce claims processing time by 50%, and lower customer premiums by 14%.

Project Performance

|	
Objectives Achievement:	The project has successfully implemented automated claim review processes and enhanced fraud detection methodologies, meeting the key objectives.
Scope Management:	The project stayed within scope by focusing on automating claims review, simplifying claims processing, and developing predictive fraud detection methods.
Schedule Adherence:	The project adhered to the schedule, save for longer than expected time to complete Exploratory Data Analysis. We made up for it by extending work hours on days 5 - 7. Overall project timeline was not compromised.
Budget Adherence:	Resource allocation was managed efficiently, ensuring that costs remained within budgetary constraints throughout the project lifecycle. Although working hours were extended on days 5 - 7, there was a buffer allocated within budget planning to prepare for such exigencies.
Resource Management:	The project team, consisting of a Project Manager, Data Scientist, Product Manager, Claims Manager, and Managing Director, effectively utilised their allocated hours to collectively achieve project success.
Risk Management:	Mitigation strategies were prepared pre-emptively to address potential risks, including customer dissatisfaction, limitations of automated fraud detection models, data security breaches, resource constraints, disruptions to BAU processes, and stakeholder disagreements. The comprehensively-prepared Risk Plan allowed us to deal with any unexpected situations.

Quality Management:	Quality assurance measures were implemented to ensure the effectiveness of fraud detection models and the accuracy of claims processing. Human supervision was also deployed as a second line of defence to ensure that predictive models were accurate.
Stakeholder Feedback:	Stakeholder feedback was regularly solicited and incorporated into project decision-making processes, fostering collaboration and alignment with project objectives.
Lessons Learned:	Lessons learned throughout the project lifecycle, including the importance of effective communication, proactive risk management, and stakeholder engagement, will inform future project endeavours.
Recommendations for Future Projects	Future projects should prioritise effective risk management, stakeholder engagement, and adherence to project scope, schedule, and budget constraints to ensure successful outcomes.
Project Approval & Sign-Off	Prepared by: Andrew Reviewed by: Trina Date: 25 March 2024
Document Links:	Executive Summary, Project Charter, Project Plan, Risk Plan

Dashboard 1 - Claim Insights

(Trending across the years from 2011 to 2021)
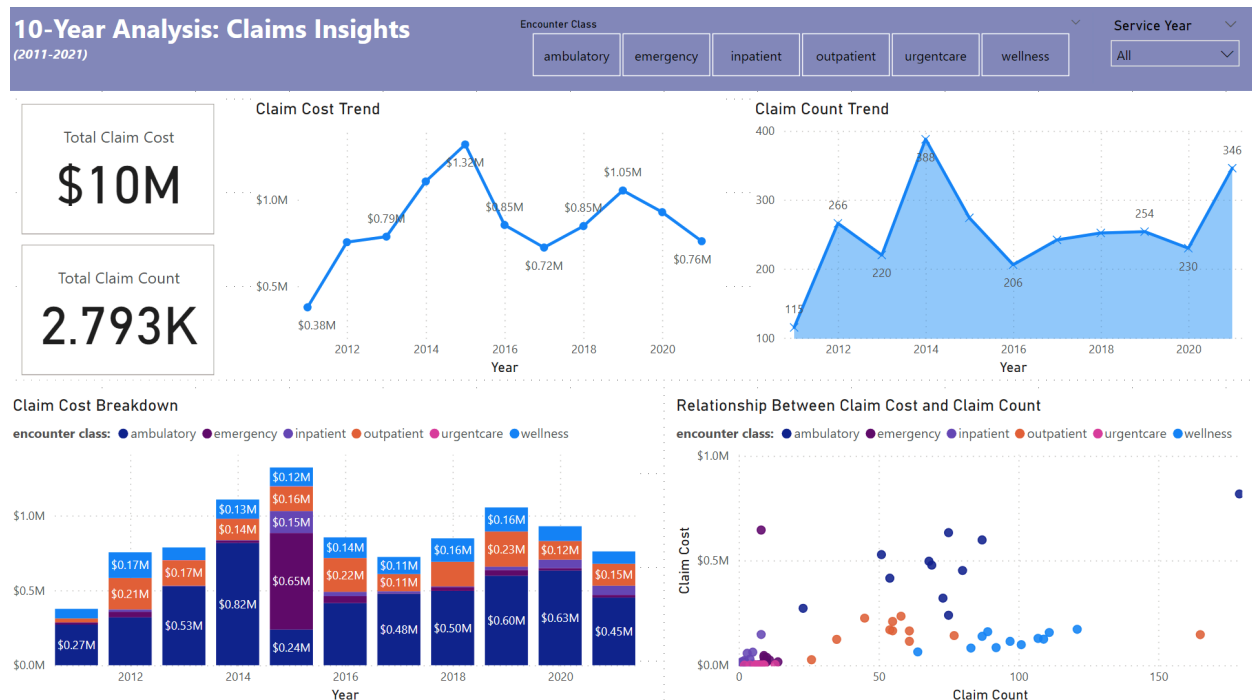
- Decrease in total claims cost but significant increase in claims volume in the past 1-2 years
- Ambulatory claims makes up a significant portion of claim costs
- But wellness claims are the bulk of the submitted claims
-

(YY) Speaker Notes from GSlides:
Why 10Y? Unable to find extremely meaningful trends within the past 5Y.

Preliminary Group Hypothesis:

Health Insurance Fraud can potentially be done in two ways, either:
1. Claiming a huge dollar sum, or:
2. Claiming many times repeatedly (churning)

This is the reason why we chose to explore costing and volume for our high level overview in Dashboard 1.
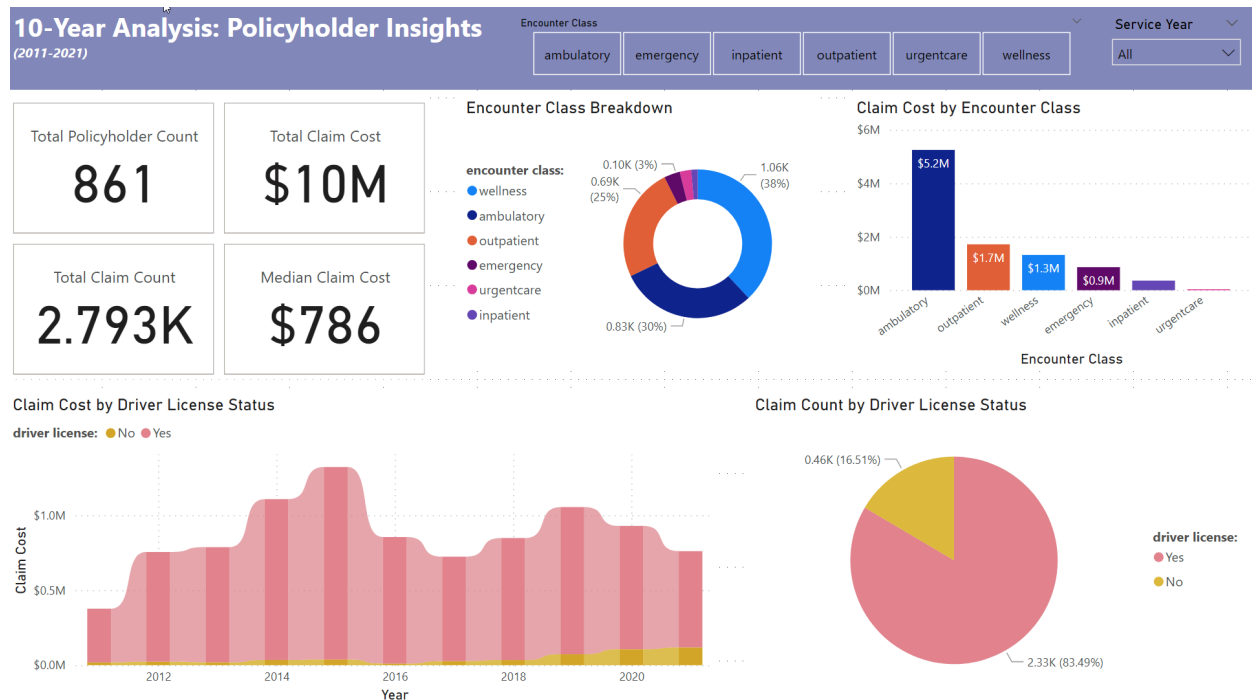
High level observations:
1. Claims cost on a downward trend since 2019, but there was a spike in 2013 to 205, and 2017 to 2019.
2. Significant increase in the number of claims processed from 2013-2014, 2020-2021
3. Interesting to note that claim volume does not necessarily seem to be correlated with claim cost (2019)
4. In general, ambulatory claims make up the bulk of payouts
5. Something that caught our attention was that : wellness claims, although low in cost, have a very high volume

reference:
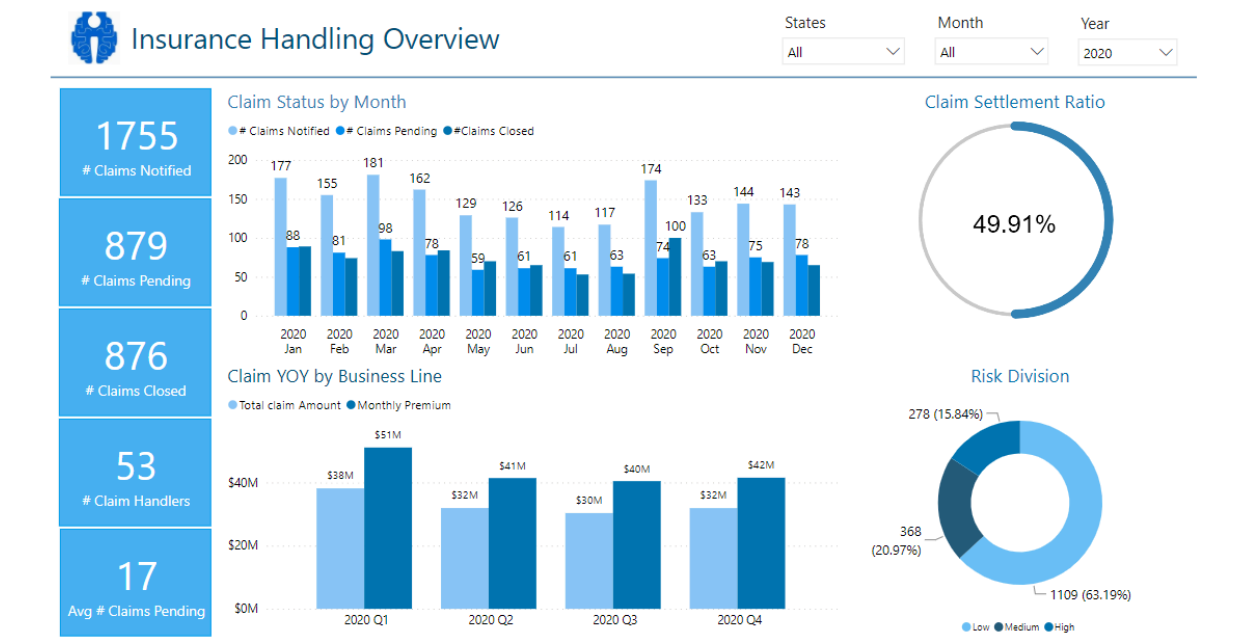
Dashboard 2 - Policyholder Insights

(General policyholder demographic breakdown for claims)

- Significantly higher claim costs for people with drivers licence

(YY) Speaker Notes from GSlides:

Following up from our high level observations, we decided to do a deep dive to see which areas had the highest number of encounters and costs.

Highest number of encounters could potentially be related to cost.

Immediately, we can see that ambulatory's claim cost takes up >50% of total claim cost, but yet interestingly, the highest incidence of encounters were in wellness.

? Some correlation between ambulatory encounters and claim cost (somewhat linear r/s)
- high incidence rate, something worth looking into
- either high amount of claims → some fraudulent claims slip through
- high $ claim amount → some might be inflated

Low wellness claim, but high claim count → also potentially sus

reference:

Policy Claim Detailed Analysis

Policy Claim Details

Policy Type
All

▼ **-50.00%**
Claims

6
Current Month

12
Previous Month

▼ **-80.00%**
Policies

9
Current Month
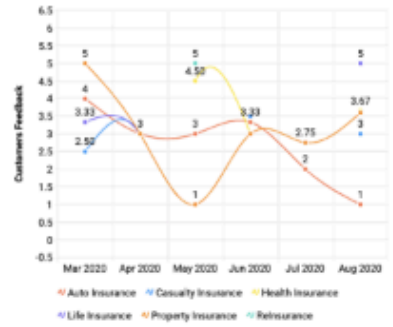
21
Previous Month

Claim Amount Comparison
Last quarter

Legend: Auto Insurance, Casualty Insurance, Health Insurance, Life Insurance, Property Insurance, Reinsurance
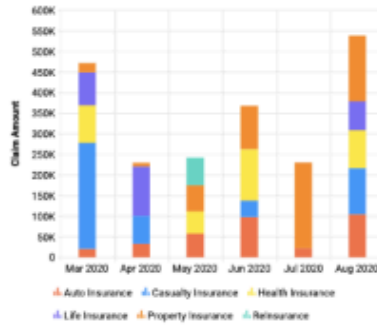
Average Number of Customers Providing Feedb...
Last quarter

Legend: Auto Insurance, Casualty Insurance, Health Insurance, Life Insurance, Property Insurance, Reinsurance

Claim Details

Claim Date	Policy Type	Claim Amount
13 Sep 2019	Life Insurance	$15,000
13 Sep 2019	Property Insurance	$15,000
06 Apr 2020	Casualty Insurance	$12,500
06 Apr 2020	Property Insurance	$9,000
12 May 2020	Auto Insurance	$25,000
12 May 2020	Health Insurance	$15,000
22 Aug 2020	Life Insurance	$70,000
22 Aug 2020	Property Insurance	$9,000
28 Aug 2020	Property Insurance	$80,000

Average Cost Per Claim
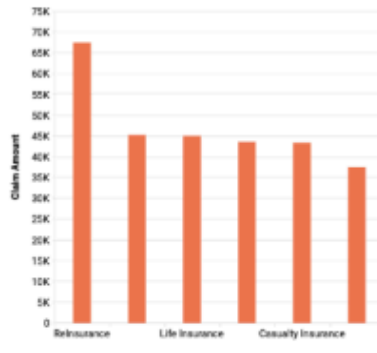
Average Days to Settle a Claim

Policy Type	Days
Casualty Insurance	28 Days
Property Insurance	28 Days
Health Insurance	27 Days
Reinsurance	26 Days
Life Insurance	25 Days
Auto Insurance	25 Days
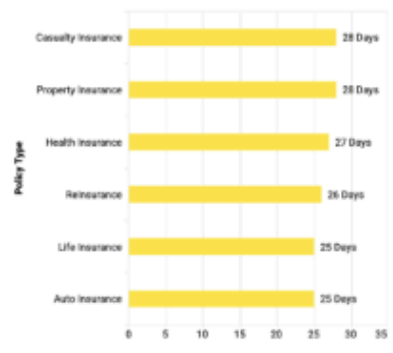
Insurance Performance Dashboard

Year
2020

Policies Sold
26

Assured Amount
$4.92M

Avg. Premium
$105.06K

Total Premium
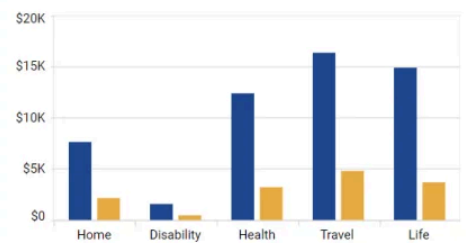**$3.82M**

Avg. Claim Processing Ti...
6 Day(s)

Assured Amount by Policy Type

Legend: Travel, Health, Life, Home, Disability

2.64%
16.89%
28.28%
24.11%
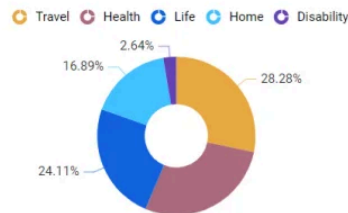
Profit vs. Expenses by Policy Type

Annual Premium Equivalent Performance (APE) by Year and Policy Type

	2020	2021	2022	2023
Travel	$16.69K	$3.85K	$12.26K	$46.61K
Life	$22.88K	$58.86K	$11.20K	$12.47K
Home	$1.31K	$53.62K	$112.10K	$48.88K
Health	$3.63K	$4.36K	$59.22K	$69.13K
Disability	$1.50K	$60.38K	$41.30K	$43.65K

Policy Claims Analysis Dashboard ⓘ

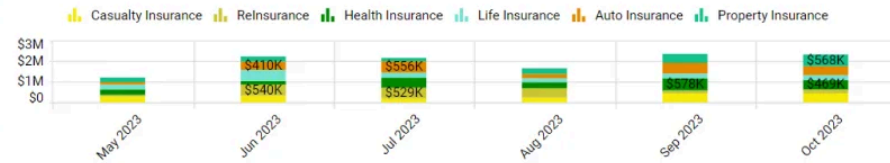⟳ ⚇ ⤢ ⋯

Policy Type

All ▾

Avg. Cost per Claim ⓘ

$20.35K

Claim Settlement Ratio ⓘ

85.44 %
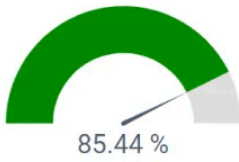
Claim Amount Comparison
Last 6 months

📊 Casualty Insurance   📊 ReInsurance   📊 Health Insurance   📊 Life Insurance   📊 Auto Insurance   📊 Property Insurance

	May 2023	Jun 2023	Jul 2023	Aug 2023	Sep 2023	Oct 2023

$3M
$2M
$1M
$0

$410K $556K $568K
$540K $529K $578K $469K

Claims Paid Out vs. Denied ⓘ
Last 6 Months

📊 Paid Out Claims   📊 Denied Claims   —o— Total Claims

Amount

$10M

$5M

$0

May 2023   Jun 2023   Jul 2023   Aug 2023   Sep 2023   Oct 2023

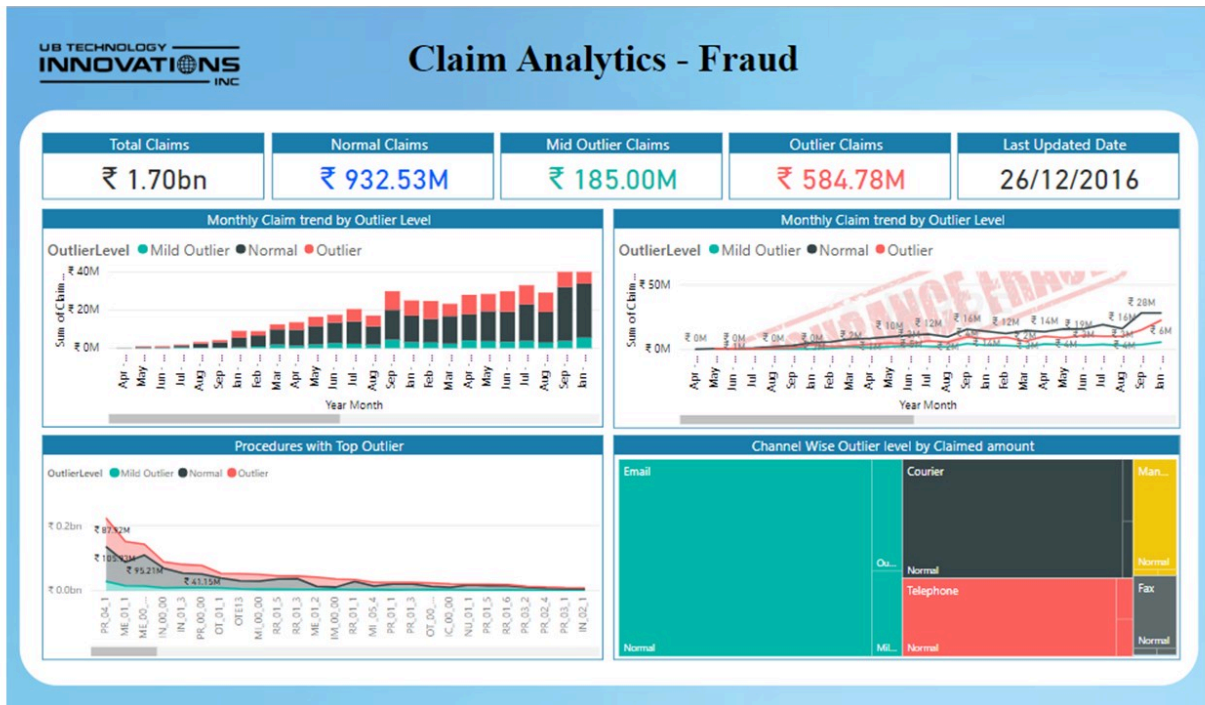90   114   136   110   143   129

Total Claims
180
160
140
120
100
80
60

Dashboard 3 - Fraud Detection

(Single out outliers based on count of claims and count of encounters)

reference:

EDA ideas

Claim Status Distribution:

- Analyse the distribution of claim statuses (Billed or Closed) to understand the proportion of claims that have been processed versus those pending.

Service Date Analysis:

- Examine the distribution of service dates to identify any trends or patterns in claim submissions over time.

Provider Analysis:

- Investigate the distribution of providers involved in the claims to identify any outliers or patterns related to claim processing.

Encounter Class Distribution:

- Explore the distribution of encounter classes (e.g., ambulatory, emergency, inpatient) to understand the types of encounters associated with the claims.

Total Claim Cost Analysis:

- Analyse the distribution of total claim costs to identify any extreme values or outliers that may indicate potential anomalies or errors.

Patient Demographic Analysis:

- Explore patient demographics such as age, gender, race, and ethnicity to understand the characteristics of individuals associated with the claims.

Diagnosis Distribution:

- Examine the distribution of diagnoses (using SNOMED-CT codes) to identify prevalent health conditions associated with the claims.

Geospatial Analysis:

- Conduct geospatial analysis using the latitude and longitude information of organisations to visualise the distribution of healthcare providers geographically.

Provider Speciality Analysis:

- Analyse the distribution of provider specialties to understand the types of healthcare services involved in the claims.

Patient Encounter Duration Analysis:

- Calculate the duration of patient encounters (stop time - start time) and analyse the distribution to identify outliers or trends in encounter durations.