

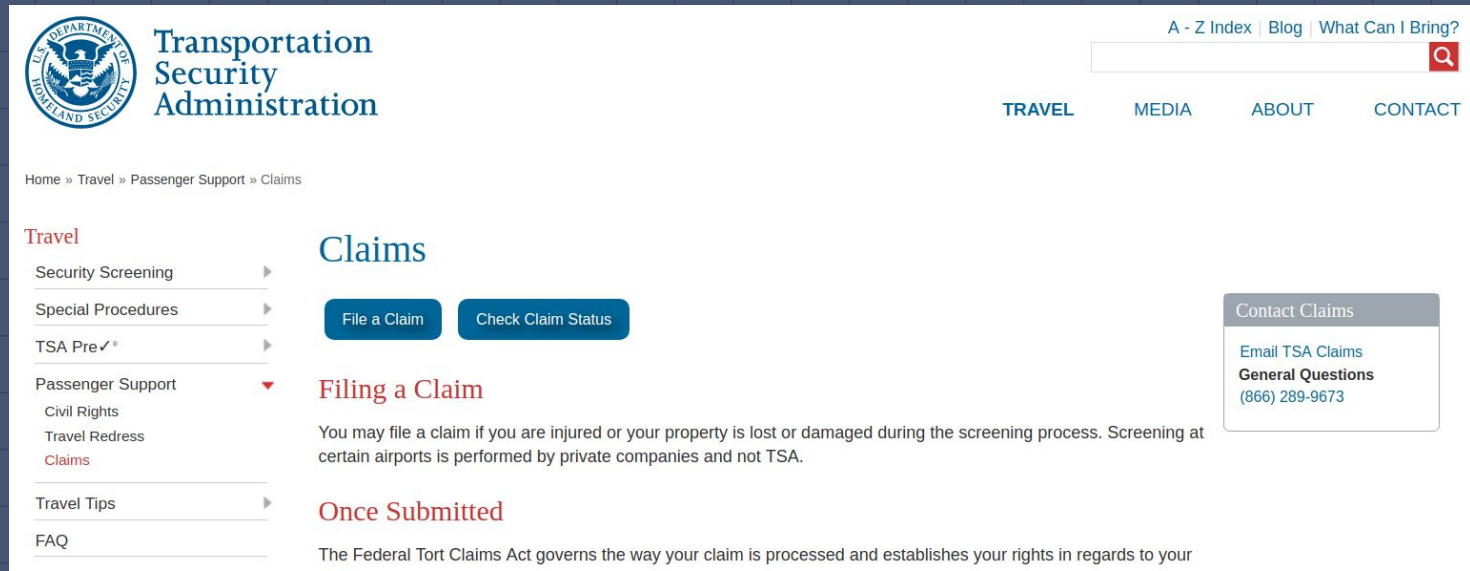
Predicting TSA Claim Results



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What Are TSA Claims?

- 1) Airport
- 2) Injury / damage due to security screening
- 3) <https://www.tsa.gov/travel/passenger-support/claims>



The screenshot shows the official TSA website's claims section. At the top left is the TSA logo and the text "Transportation Security Administration". To the right are links for "A - Z Index", "Blog", and "What Can I Bring?", along with a search bar. Below these are navigation links for "TRAVEL", "MEDIA", "ABOUT", and "CONTACT". A breadcrumb trail reads "Home » Travel » Passenger Support » Claims". On the left is a sidebar menu with categories like "Travel", "Security Screening", "Special Procedures", "TSA Pre✓®", "Passenger Support" (which is expanded to show "Civil Rights", "Travel Redress", and "Claims"), "Travel Tips", and "FAQ". The main content area is titled "Claims" and features two buttons: "File a Claim" and "Check Claim Status". Below this is a section titled "Filing a Claim" with a paragraph explaining that claims can be filed for injuries or property damage during screening. Further down is a section titled "Once Submitted" which begins to explain the Federal Tort Claims Act. On the right side of the main content area is a "Contact Claims" box with links for "Email TSA Claims" and "General Questions" along with the phone number "(866) 289-9673".

U.S. DEPARTMENT OF HOMELAND SECURITY
Transportation Security Administration

A - Z Index | Blog | What Can I Bring?

TRAVEL | MEDIA | ABOUT | CONTACT

Home » Travel » Passenger Support » Claims

Travel

- Security Screening
- Special Procedures
- TSA Pre✓®
- Passenger Support
 - Civil Rights
 - Travel Redress
 - Claims**
- Travel Tips
- FAQ

Claims

[File a Claim](#) [Check Claim Status](#)

Contact Claims

[Email TSA Claims](#)
General Questions
(866) 289-9673

Filing a Claim

You may file a claim if you are injured or your property is lost or damaged during the screening process. Screening at certain airports is performed by private companies and not TSA.

Once Submitted

The Federal Tort Claims Act governs the way your claim is processed and establishes your rights in regards to your

Why is it useful?

- Passenger (or Travel Insurance)
 - Is it worth the taking time to file?
 - Will TSA reimburse this claim?
- TSA:
 - How should we triage new claims?
 - Which claims should we prevent to reduce cost?

Data Set

- Kaggle Dataset
 - 200k published claims from 2002-2015
 - Source: www.dhs.gov/tsa-claims-data

- Columns:

Claim Result

Claim Amount

Report Date

Incident Date

Claim Type

Claim Site

Airport Code / Name

Airline

Item Description

Disposition

Close Amount

Claim ID

Target

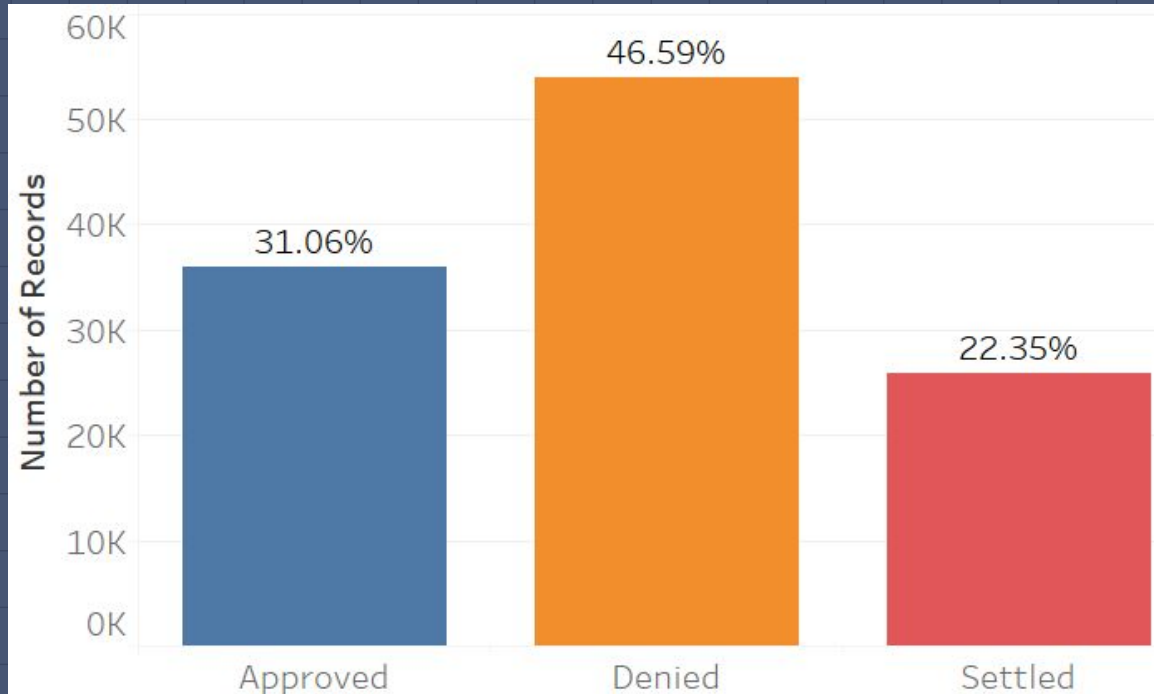
Numeric

Categorical

Discarded

Target Class Balance

Claim Status



Workflow

1. Data Cleaning
2. Feature Engineering
3. Feature Selection
4. Model Selection
5. Model Tuning

Workflow - Data Processing

Data Cleaning

Removed rows missing > 5 values

Drop nulls for numeric columns

Filled nulls for categorical columns

Fixed:

- Date formats
- Number formats
- Misspelled / inconsistent category values

~140k remaining rows

Feature Engineering

Generalize dates

- Delay (report - incident)
- Day, Month, ~~Year~~

Merge low frequency categories

Convert categorical to numeric

- Dummy vars
- Frequency (in train set)
 - Rank
 - Count

~18 Features

Workflow - Selection / Validation

Feature Selection

[Model: Random Forest]

	Accuracy
Baseline (Claim Amount)	51.5
+Date	52.7
+Category	
▫ Dummy	53.7
▫ Rank	54.2
▫ Count	54.2
▫ Rank + Count	54.1
+ Date + Count	56.5

Model Selection

[Features: Date + Count]

	Accuracy
Naive Bayes	31.3
Logistic Reg.	47.5
SVM	---
Random Forest	56.4
XGBoost	57.5

5-fold cross-validation on 80% of data

Workflow - Tuning / Test

Model Tuning

[Model: XGBoost]

Goal: Maximize accuracy

Grid Search, via AWS:

- Max Depth
- Subsamples
- Child Weight
- Features per tree

		Predicted		
Actual		Approved	Denied	Settled
	Approved	20.3%	9.4%	1.6%
	Denied	10.3%	34.6%	1.9%
	Settled	5.0%	14.2%	2.8%

Accuracy: 57.6%

	Precision	Recall	F1
Approved	57.0%	64.9%	60.7%
Denied	59.4%	74.0%	65.9%
Settled	44.4%	12.6%	19.6%
Average	55.4%	57.6%	54.1%

Test on 20% Holdout

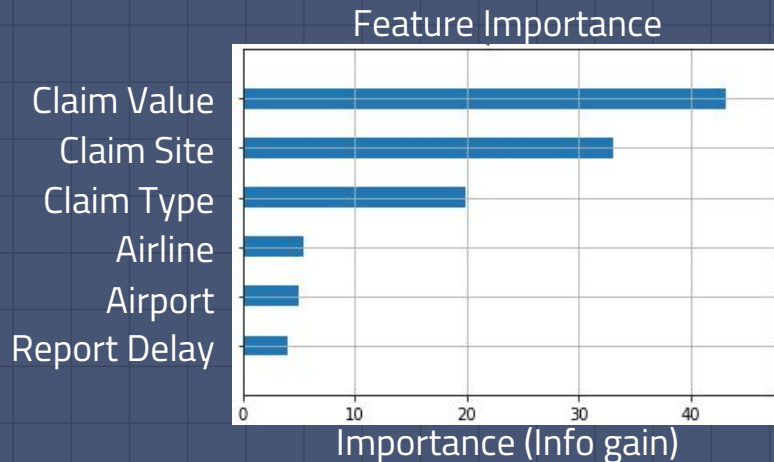
How do we use it?

Passenger / Insurance

- Predict your claim result
- Compare opportunity cost vs. expected return
- Adjust loan / benefits based on TSA judgment

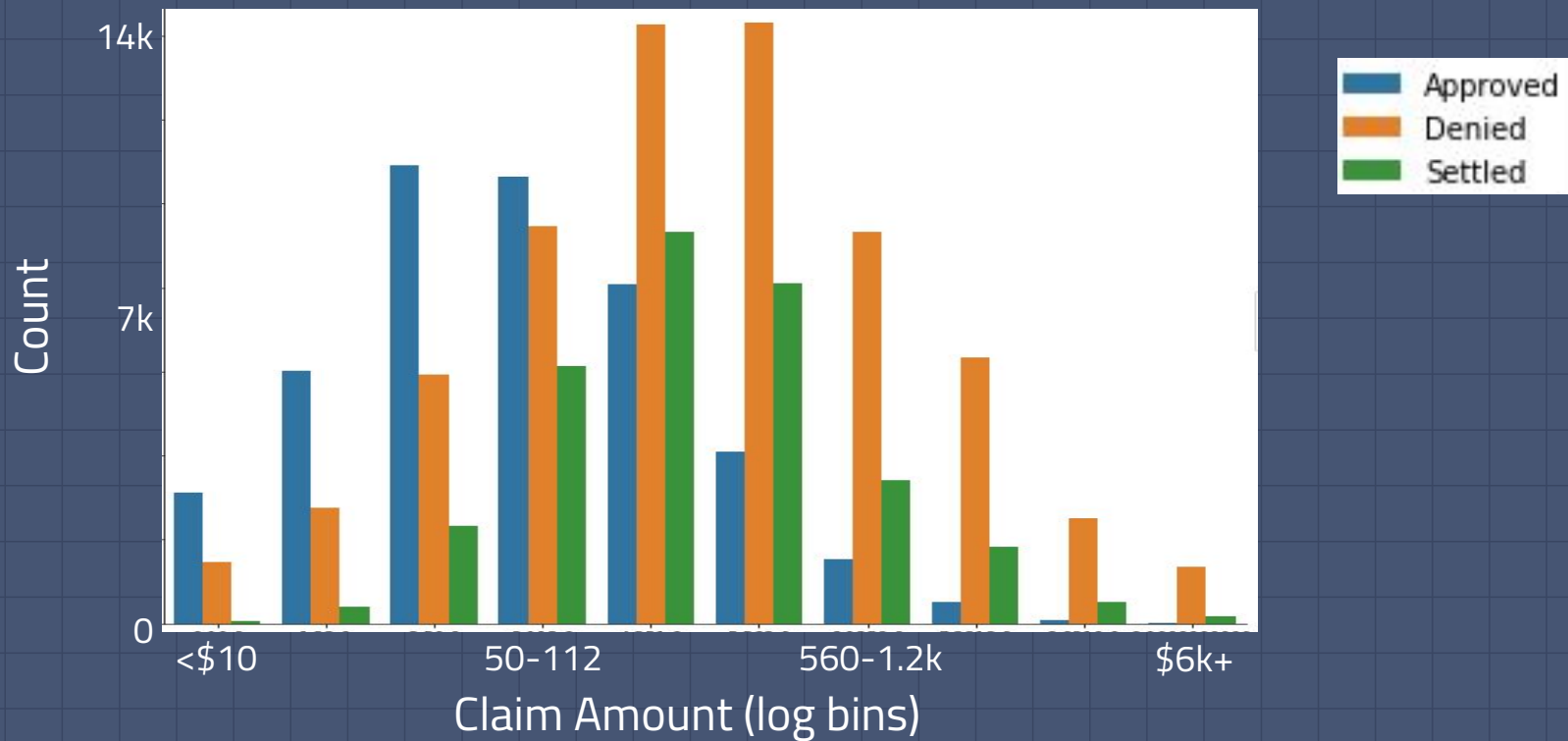
TSA

- Triage by predicted status and confidence
- Prioritize predictive features for mitigation efforts



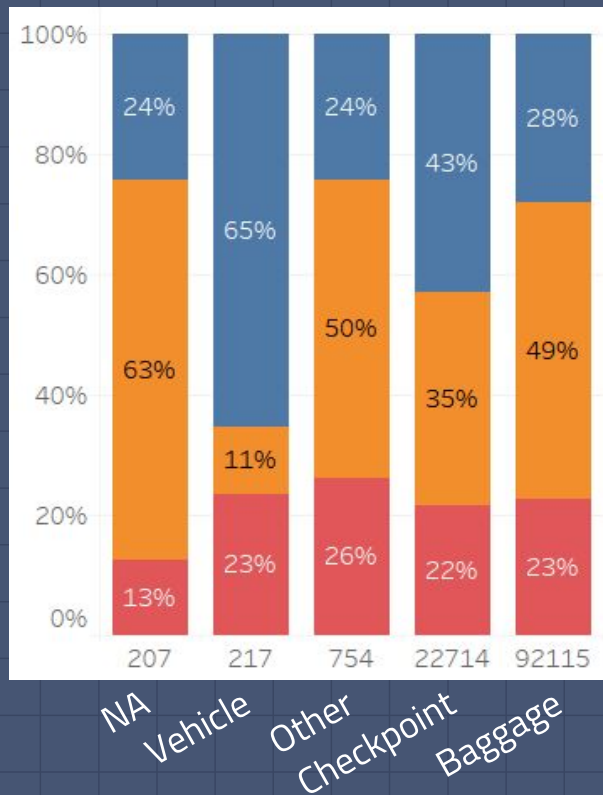
Predictive Features

Claim Amount

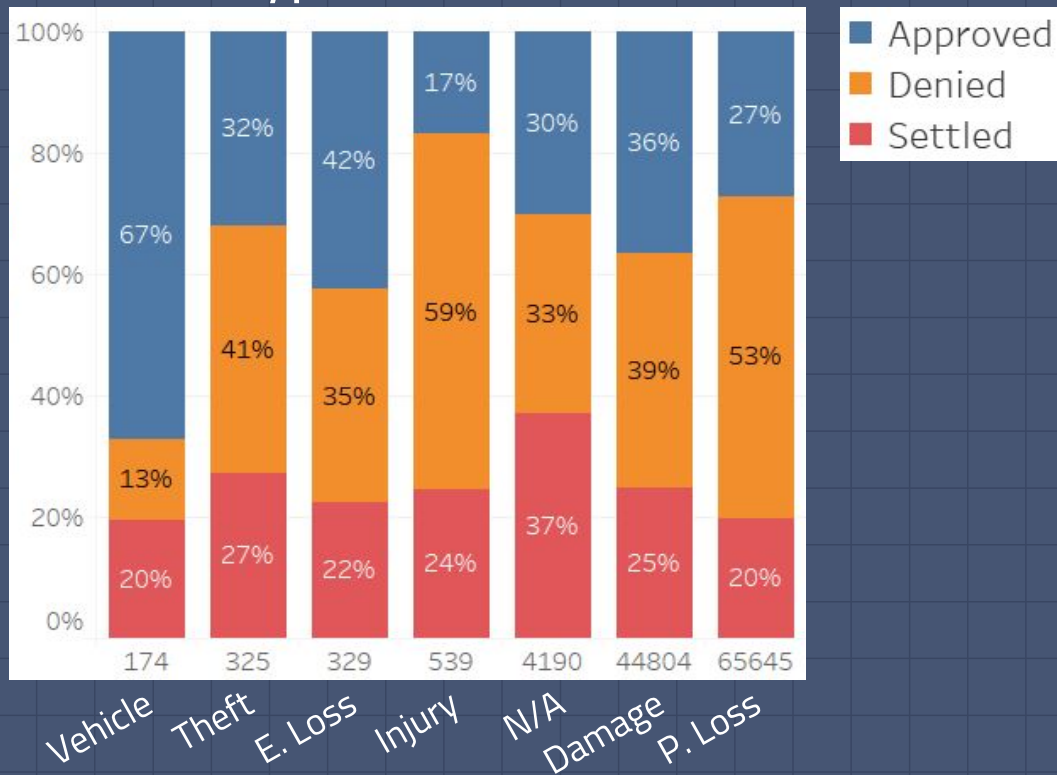


Predictive Features

Claim Site



Claim Type



Future Work

Add feature using Item Description

Optimize for performance on specific target class

- Pick a use case!
- Improve Approve / Deny / Settle depending on use case
- Resample or combine Settled cases with Approved

Host on interwebz

Thank you!