CitiusTech

Shaping Healthcare Possibilities

Success Story

Predicting medical claims denial with machine earning

Client Profile

CitiusTech helped a leading Revenue Cycle Management Company serving hospitals, health systems and physician groups to improve its claims Denial management by predicting claims denials prior to submission. Client wanted to leverage Machine Learning to automatically filter claims for particular denial reason i.e., to predict if a claim line would be denied due to 'Medical Necessity' or not.

The Challenge

Predict Claims Denial

- Claims Denial due to 'Medical Necessity' with 95% precision and at least 50% recall
- Improve accuracy of Claim tagging for denial reason ('Medical Necessity')

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95%
Model precision

74%
Recall

75%*
Reduced manual review effort

Disclaimer – Manual Review effort is calculated based on offline model prediction
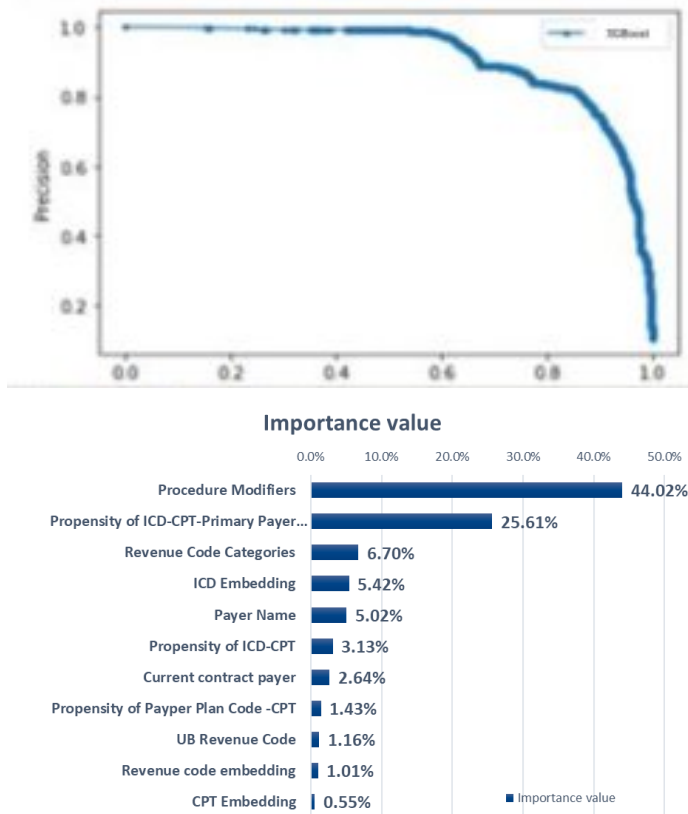
The Solution

Solution Input

- Claims from 835 data for 10.5 Mn claim lines

Solution Modeling

- Classification & Regression Algorithms
- Added propensity features related to ICD, CPT, Revenue Codes & Payer plan code
- Created features of CPT, Revenue & ICD codes using Word2Vec and Semi Local embeddings
- Added Semi-Local features to capture intra-claim interactions
- Various sampling techniques (SMOTE, down-sampling, etc.) explored to deal with imbalanced dataset

Model Algorithm – XGBoost Train –test split: 90:10

Importance value

Feature	Importance value
Procedure Modifiers	44.02%
Propensity of ICD-CPT-Primary Payer...	25.61%
Revenue Code Categories	6.70%
ICD Embedding	5.42%
Payer Name	5.02%
Propensity of ICD-CPT	3.13%
Current contract payer	2.64%
Propensity of Payper Plan Code -CPT	1.43%
UB Revenue Code	1.16%
Revenue code embedding	1.01%
CPT Embedding	0.55%

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Thank You

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CitiusTech is a global IT services, consulting, and business solutions enterprise 100% focused on the healthcare and life sciences industry. We enable 140+ enterprises to build a human-first ecosystem that is efficient, effective, and equitable with deep domain expertise and next-gen technology.

With over 8,500 healthcare technology professionals worldwide, CitiusTech powers healthcare digital innovation, business transformation, and industry-wide convergence through next-generation technologies, solutions, and products

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