Project Overview: Improve the Scalability & Efficiency of Billing Operations

Goal:
• Help Invitae improve healthcare for billions with genetics
• Provide payment estimations on insurance & patients
• Optimize billing for higher scalability & efficiency

Objective 1: Revenue Analysis with Change in Billing Process

Goal: Predict order payment results
• Optimize appeals decisions
• Enhance profits & scalability given limited resources

Target Variables
<table>
<thead>
<tr>
<th>Features</th>
<th>Evaluation metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paid</td>
<td>Accuracy metrics (prediction): AUC/accuracy/precision/recall</td>
</tr>
<tr>
<td>Paid amount</td>
<td>Business metrics (optimization): increase in profits</td>
</tr>
<tr>
<td>Turnaround time</td>
<td>instant payment amount when paid</td>
</tr>
</tbody>
</table>

Question: how to reduce unhelpful appeals & save costs?
Solution: Prediction (identification) -> Optimization (prioritization)
Baseline (current method): always appeal
Optimized: only appeal when expected revenues > costs

Recent Billing Process Revision
Understand how the change impacts billing results
Adjust billing process further to improve billing outcome

Objective 2: Claim Payout Prediction & Appeals Optimization

Goal: Pocket Estimation

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Question: what order estimate would improve customer retention?
Solution: Prediction (identification) -> Optimization (prioritization)
Baseline (current method): always appeal
Optimized: only appeal when expected revenues > costs

Stacked Model vs. Current Estimation
More accurate prediction

Impact

Revenue Analysis with Change in Billing Process
Helped the business better define future billing operation policies

Claim Payout Prediction & Appeals Optimization
Projected to increase $1-4M in profits on erroneous orders

Patient Out-of-Pocket Estimation
Provided more accurate patient out-of-pocket estimate which would improve customer retention

Objective 3: Patient Out-of-Pocket Estimation

Goal: Provide patients an out-of-pocket estimation that is as close to actual patient responsible payment amount as possible

Data: Primary payor group, primary commercial area, billed price, month of testing, shipping state population...

Underestimate Price
Frustration and complaints after the actual price is revealed

Overestimate Price
Patient is uninclined to take the test or switch to competitors

Pre-process Data
Built and fine-tuned models
Adjust model based on previous results
Compare model results

Stacked Model vs. Current Estimation
53% decrease in absolute error

Next Steps
Further customer research
Actual price range given to customer
- How wide should the range be?
- Do customers prefer under- or over-estimation?

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Helped the business better define future billing operation policies

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