

Model Performance:

- Accuracy of the model: Let's assume your model has an accuracy of 85%, meaning it correctly predicts whether an item will be purchased or returned 85% of the time.

Transaction Volume:

- Let's assume you have a total of 500,000 transactions on Black Friday.

Business Impact:

- Assume that the cost of misclassifying a purchase as a return or vice versa is significant and avoiding these errors will have a positive impact on revenue.

Cost of Model Implementation:

- Assume the cost of implementing and maintaining the model for Black Friday is \$50,000.

Increased Revenue:

- Assuming a conservative estimate that the model helps in preventing 5% of potential returns.

Now, let's calculate the ROI:

- **Transaction Volume:** 500,000 transactions
- **Model Accuracy:** 85%
- **Potential Returns without Model:** $500,000 * (1 - \text{Accuracy}) = 500,000 * 0.15 = 75,000$
- **Potential Returns Avoided with Model:** $75,000 * 5\% = 3,750$
- **Assumed Revenue per Transaction:** \$100 (this can vary based on your actual average transaction value)
- **Total Increased Revenue:** $3,750 * \$100 = \$375,000$

ROI Calculation:

$$\text{ROI} = \frac{\text{Total Increased Revenue} - \text{Cost of Model Implementation}}{\text{Cost of Model Implementation}}$$

$$\text{ROI} = \frac{\$375,000 - \$50,000}{\$50,000}$$

$$\text{ROI} = 6.5$$