Binary Classification Setup	Positive Class	False Positive (FP)	False Negative (FN)	More Serious (FP or FN)	Metric (Recall or Precision)	Data Imbalance
Spam Email Detection for Adult User	Email is spam	Algorithm detects email as spam, but it is not	Algorithm detects email as not spam, but it is spam	False Positive (important email could go to spam folder)	Precision (minimizing FPs)	Yes, fewer spam emails compared to non-spam emails
Spam Email Detection for Child User	Email is spam	Algorithm detects email as spam, but it is not	Algorithm detects email as not spam, but it is spam	False Negative (spam email could go to inbox)	Recall (minimizing FNs)	Yes, fewer spam emails compared to non-spam emails
Fraud Detection for International Credit Card Transactions	Transaction is fraudulent	Algorithm flags a transaction as fraudulent, but it is not	Algorithm does not flag transaction that ends up being fraudulent	False Negative (missed fraudulent transaction can cause financial loss)	Recall (minimizing FNs)	Yes, fewer fraudulent transactions compared to legitimate ones
Fraud Detection for UPI Payment to Enter Into a Movie Theatre	Transaction is fraudulent	Algorithm flags a transaction as fraudulent, but it is not	Algorithm does not flag transaction that ends up being fraudulent	False Positive (many legitimate transactions flagged as fraudulent may lead to many movie goers arguing with the ticketing staff)	Precision (minimizing FPs)	Yes, fewer fraudulent transactions compared to legitimate ones
Loan Default Prediction	Borrower will default on the loan	Algorithm predicts loan default, but borrower does not default	Algorithm predicts no loan default, but borrower defaults	False Negative (loan default not predicted can lead to financial losses)	Recall (minimizing FNs)	Yes, fewer default cases compared to successful loan repayments
Credit Card Approval	Credit card application is approved	Algorithm approves a card for someone who should not have been approved	Algorithm does not approve someone who should have been approved	False Positive (approving credit for someone who may default is riskier)	Precision (minimizing false positives)	Yes, fewer risky applicants compared to non-risky ones
Satellite Launch Day Selection	Day is approved as safe for launching	Algorithm approves a day as safe for launch and it turns out to be not	Algorithm does not approve a day as safe for launch and it turns out to be safe	False Positive (approving a risky day for launching may lead to serious consequences for the personnel involved)	Precision (minimizing false positives)	Depending on the time of the year it could be balanced or imbalanced
Bank Call Centre Call for Two-wheeler Loan Offer	Customer on call accepts loan offer	Algorithm predicts customer will accept offer, but ended up not accepting it	Algorithm predicts customer will not accept offer, but they would have actually accepted	False Negative (missing a customer who will have accepted the loan offer will lead to financial losses)	Recall (minimizing FNs)	Depends on whether the offer is for an electric two-wheeler (balanced) or not (imbalanced), for example
Airport Screening of Luggage for Explosives	Explosive is present	Algorithm predicts explosive is present, but it turned out to be a benign object; a laptop battery, for example	Algorithm predicts no explosive is present, but luggage actually has a harmful explosive	False Negative (a harmful explosive not predicted can lead to a great human loss)	Recall (minimizing FNs)	Yes, fewer luggage containing explosives compared to normal ones
Intrusion Detection	Network intrusion occurs	Algorithm flags an intrusion, but there was no intrusion	Algorithm does not detect an actual intrusion	False Negative (a missed intrusion can compromise the system)	Recall (minimizing false FNs)	Yes, fewer intrusion events compared to normal network activity
Customer Churn Prediction	Customer will churn	Algorithm predicts customer will churn, but they don't	Algorithm predicts customer won't churn, but they do	False Negative (failing to retain a churned customer could lose business)	Recall (minimizing FNs)	Typically balanced between churn and no-churn cases
Sentiment Analysis of Reviews	Review is positive	Algorithm classifies a negative review as positive	Algorithm classifies a positive review as negative	False Negative (missing a positive review in feedback analysis)	Recall (minimizing FNs)	Typically, roughly equal number of positive and negative reviews
Gender Recognition	Person is male	Algorithm identifies a person as male, but they are not	Algorithm identifies a person as not male, but they are	Depends on the application	Precision (if FP is more serious), Recall (if FN is more serious)	No, balanced distribution between male and female