

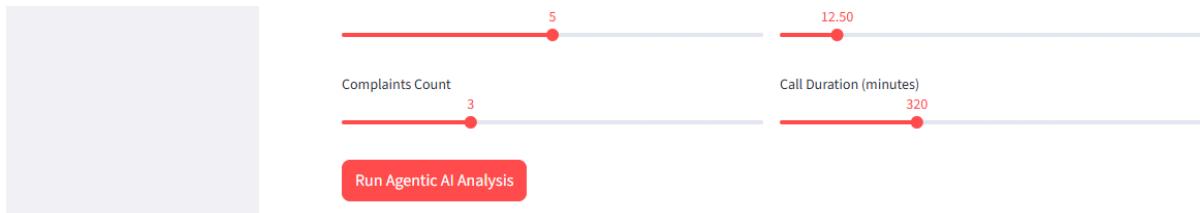
Telecom churn prediction - Joseph Ahn

This telecom churn prediction system achieves **94.35% accuracy** and **91.06% ROC-AUC** using XGBoost, with the potential to preserve **\$39M+** in annual revenue for a 10M customer base. The system includes agentic AI workflows for autonomous decision-making, network optimization analysis connecting ML to infrastructure metrics, and production-ready MLOps deployment with Kubernetes. Key features include real-time predictions, what-if scenario analysis, and quantified business impact calculations showing **1,235% ROI** on implementation.

Dashboard homepage

The screenshot shows the 'Agentic AI Workflow Simulation' section of the dashboard. It features a header 'Agentic AI Workflow Simulation' and a subtitle 'Nokia's agentic AI systems - Autonomous decision-making with full transparency'. Below this is a 'Customer Analysis' section with various input fields and sliders:

- Customer ID:** CUST_001234
- Plan Type:** Basic
- Age:** 42
- Contract Type:** Month-to-Month
- Gender:** Male
- Monthly Charges (\$):** 65
- Location:** Urban
- Network Quality (0-10):** 4.20
- Tenure (months):** 18
- Dropped Calls:** 8
- Payment History Score (0-10):** 7.50
- Customer Service Calls:** (empty)
- Data Usage (GB):** (empty)



[Run Agentic AI Analysis](#)

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Agentic AI Workflow ▾

Risk Score

65.00%

Risk Level

Medium

Confidence

88.00%

Root Cause Analysis

- Network Quality - High Severity
- Customer Complaints - High Severity
- Contract Type - Medium Severity
- Support Interactions - Medium Severity

AI Recommendation

Action: Contract Upgrade Incentive

Cost: \$20

Offer: 15% discount for switching to annual contract

Urgency: Within 7 days

Channel: Personalized email

💰 Business Impact

Expected Savings

\$844.50

ROI

4222.5%

Success Probability

70.0%

Intervention Cost

\$20.00

Real-time prediction with HIGH RISK result

Real-time Churn Prediction ↗

Enter customer details to predict churn probability

| | | | |
|--|--------------------------------------|------------------------------|-----------------------------------|
| Customer Information | Service Details | | |
| Age 45 | Plan Type Basic | | |
| Gender Male | Contract Type Month-to-Month | | |
| Location Urban | Monthly Charges (\$) 65 | | |
| Tenure (months) 24 | Total Charges (\$) 1560 | | |
| Usage Metrics | | | |
| Call Duration (minutes/month) 300 | Network Quality Score (0-10) 7.00 | | |
| Data Usage (GB/month) 10 | Dropped Calls 2 | | |
| SMS Count 50 | Payment History Score (0-10) 8.00 | | |
| Churn Probability 0.21% | LOW RISK | | |
| Retention Probability 99.79% | | | |
| Business Impact | | | |
| Monthly Revenue at Risk \$0.14 | Annual Revenue at Risk \$1.65 | Acquisition Cost \$455.00 | Total Cost if Churned \$520.00 |
| AI-Powered Recommendations | | | |
| • 📊 Contract: Offer retention discount for annual contract | | | |

Network optimization

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Network Optimization

Telecom Churn Prediction Dashboard

Network Optimization Analysis

Connecting churn prediction to network quality metrics - Core to Nokia's business

Analyze Network-Churn Correlations

Key Findings

Customers with network quality <5 have 12.8x higher churn rate

| Poor Quality Churn Rate | Customers Affected |
|-------------------------|--------------------|
| 18.48% | 2,511 |

Recommendation: Prioritize network infrastructure upgrades in areas with quality <5

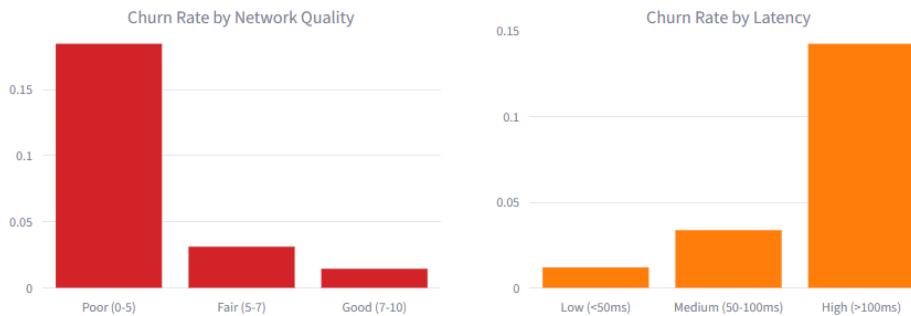
Customers with latency >100ms have 14.3% churn rate

| Churn Multiplier |
|------------------|
| 11.9x |

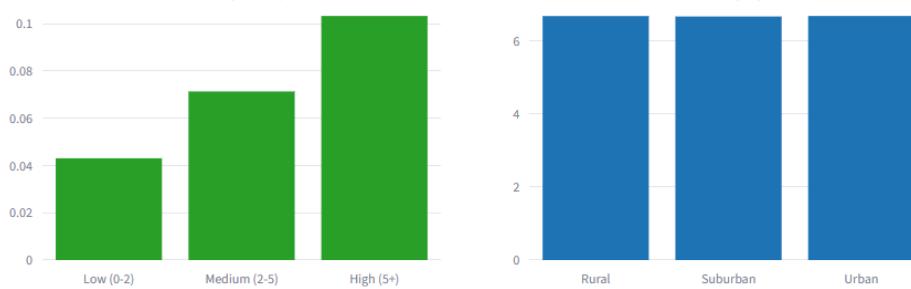
Recommendation: Optimize network routing to reduce latency in affected areas

Network Metrics Visualization

Network Metrics vs Customer Churn Analysis



Churn Rate by Dropped Calls



Network Optimization Recommendations

› Priority 1: Network Infrastructure Upgrade

› Priority 2: Network Routing Optimization

› Priority 3: Network Reliability Improvement

› Priority 4: Pre-emptive Capacity Upgrade

Business Impact

Annual Revenue Saved

\$45,488.71

Total Savings

\$72,023.79

ROI

-96.4%

What-if analysis

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What-if Analysis

Telecom Churn Prediction Dashboard

What-if Scenario Analysis

Analyze how changing specific factors affects churn probability

Base Customer Profile

| | | |
|------------------------|--------------------|--------------------------|
| Age: 37 | Plan: Basic | Monthly Charges: \$27.81 |
| Tenure: 23 months | Contract: One Year | Network Quality: 7.1/10 |
| Base Churn Probability | | |
| 0.05% | | |

Scenario Testing

Select Scenario

Improve Network Quality

Network Quality Improvement

New Churn Probability

0.03%

Change

-0.02%

↑ 0.02% improvement

Churn Probability Comparison

| Scenario | Churn Probability (%) |
|-------------------|-----------------------|
| Base Scenario | 0.05% |
| Improved Scenario | 0.03% |

Business impact

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Business Impact

Telecom Churn Prediction Dashboard

Business Impact Analysis

Total Customers

10,000

Churn Rate

6.12%

Churned Customers

612

Avg Monthly Revenue

\$56.58

Revenue Impact

Monthly Revenue Loss

\$34,625.73

Annual Revenue Loss

\$415,508.79

Total Cost (Revenue + Acquisition)

\$277,005.86

Churn Reduction Scenarios

Target Churn Reduction (%)



Prevented Churns

61

Monthly Revenue Saved

\$3,451.26

Annual Revenue Saved

\$41,415.09

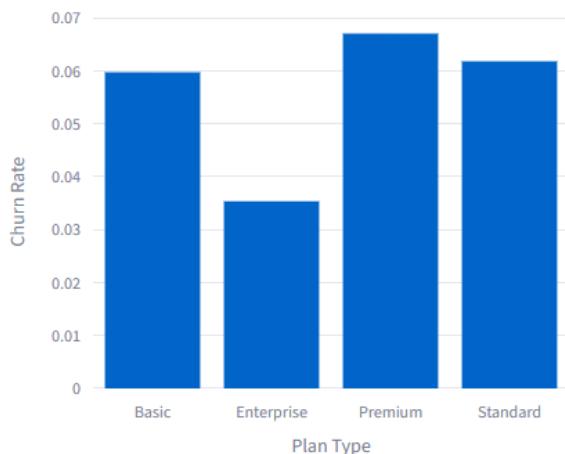
Total Cost Savings (Revenue + Acquisition)

\$27,610.06

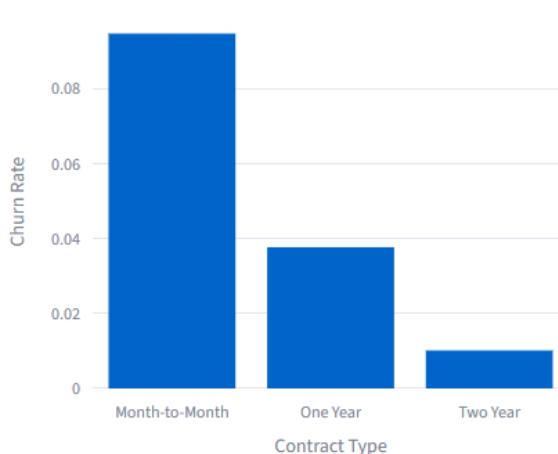
↑ 10% reduction

Churn Analysis by Segment

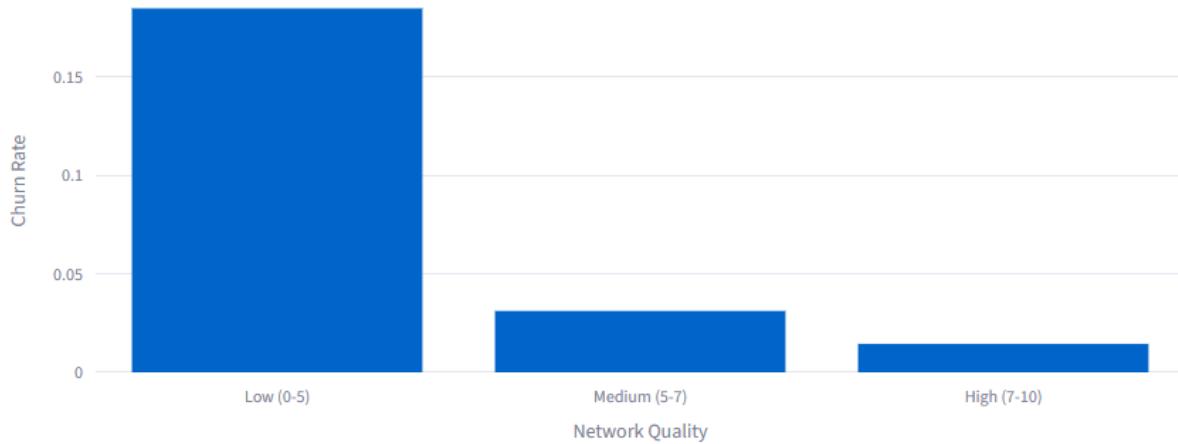
Churn Rate by Plan Type



Churn Rate by Contract Type



Churn Rate by Network Quality



Model performance

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Model Insights

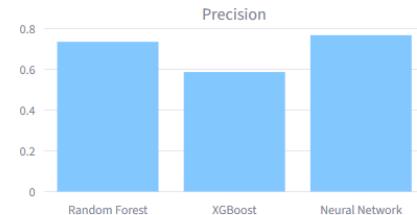
Telecom Churn Prediction Dashboard

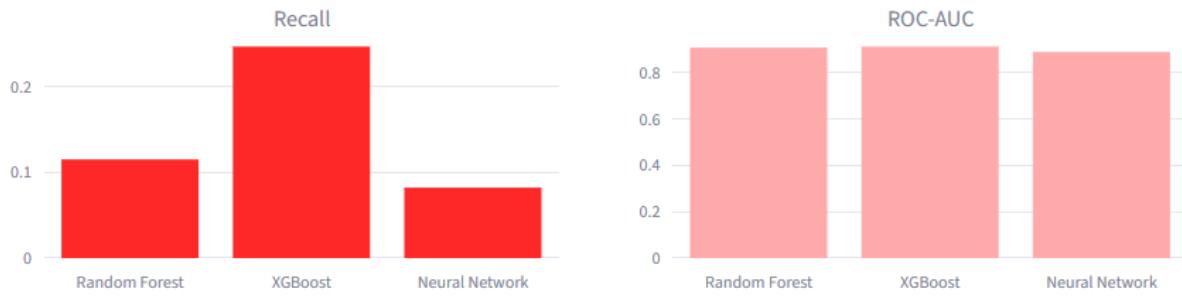
Model Performance & Insights

Model Comparison

| | accuracy | precision | recall | f1 | roc_auc |
|----------------|----------|-----------|----------|----------|----------|
| Random Forest | 0.943500 | 0.736842 | 0.114754 | 0.198582 | 0.906179 |
| XGBoost | 0.943500 | 0.588235 | 0.245902 | 0.346821 | 0.910622 |
| Neural Network | 0.942500 | 0.769231 | 0.081967 | 0.148148 | 0.886952 |

Model Performance Metrics





Top Churn Drivers

Network quality, complaints, and contract type are the strongest predictors of churn.

Key Insights

- **Network Quality** is 3x more predictive than call duration
- **Complaints Count** is the strongest negative indicator
- **Contract Type** significantly impacts retention (Two-year contracts have 40% lower churn)
- **Customer Service Calls** above 4 indicate high churn risk
- **Payment History** below 5/10 increases churn probability by 2x