

Financial Operations Analytics

Revenue Forecasting, Churn & Profitability Analysis

A Comprehensive End to End Financial Analytics Project

Duration: 2-3 Hours | Recorded Lectures Available

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Project links:
<https://www.skillsetmaster.com/data-analytics>

Tools: Python | Pandas | Scikit-learn | Prophet | Statsmodels



Follow: @datawithashok



Project Overview

1. Revenue Forecasting

- Predict monthly/quarterly revenue
- Identify seasonal patterns and trends
- Support strategic financial planning

2. Customer Churn Analysis

- Identify at-risk customers before they churn
- Calculate customer lifetime value (CLV)
- Reduce churn through targeted interventions

3. Profitability Analysis

- Segment customers by profitability
- Optimize pricing and resource allocation
- Maximize ROI across customer cohorts

Financial customers

customer_id	signup_date	segment	industry	country	plan	mrr	contract_len	number_of_u	support_tickets	usage_score	nps_score	churn_date
CUST_00000	1/31/23	Startup	Healthcare	Other	Basic	49	24	3	2	53	7	
CUST_00000	12/30/23	Startup	Retail	USA	Basic	49	12	4	1	55	60	
CUST_00000	5/10/22	Small Busine	Retail	Other	Professional	149	12	8	1	52	7	3/22/24
CUST_00000	7/18/23	Startup	Retail	USA	Business	399	1	1	3	54	17	
CUST_00000	2/4/23	Startup	Technology	USA	Business	399	12	2	0	55	100	
CUST_00000	12/31/22	Small Busine	Retail	UK	Basic	49	12	6	1	45	-11	
CUST_00000	9/20/24	Small Busine	Other	Canada	Professional	149	1	5	2	50	9	
CUST_00000	11/10/22	Startup	Finance	USA	Business	399	24	4	3	68	3	
CUST_00000	6/26/24	Enterprise	Manufacturir	USA	Professional	149	1	407	2	44	94	
CUST_00001	5/1/20	Startup	Retail	Australia	Basic	49	12	1	3	71	-22	
CUST_00001	4/11/21	Mid-Market	Real Estate	Other	Business	399	12	34	3	33	64	
CUST_00001	5/23/23	Small Busine	Real Estate	USA	Basic	49	36	5	0	71	-34	

Financial transactions

transaction_id	customer_id	transaction_date	amount	transaction_type	status	payment_method	year_month	cohort_month	transaction_index
CUST_00000	CUST_00000	1/31/23	52.78	New	Completed	Credit Card	2023-01	2023-01	2023-01
CUST_00000	CUST_00000	2/28/23	52.87	Subscription	Completed	Credit Card	2023-02	2023-01	2023-02
CUST_00000	CUST_00000	3/28/23	52.84	Subscription	Completed	Credit Card	2023-03	2023-01	2023-03
CUST_00000	CUST_00000	4/28/23	53.22	Subscription	Completed	Credit Card	2023-04	2023-01	2023-04
CUST_00000	CUST_00000	5/28/23	51.86	Subscription	Completed	Wire Transfer	2023-05	2023-01	2023-05
CUST_00000	CUST_00000	6/28/23	47.05	Subscription	Completed	PayPal	2023-06	2023-01	2023-06
CUST_00000	CUST_00000	7/28/23	49.53	Subscription	Completed	Wire Transfer	2023-07	2023-01	2023-07
CUST_00000	CUST_00000	8/28/23	47.83	Subscription	Completed	Credit Card	2023-08	2023-01	2023-08
CUST_00000	CUST_00000	9/28/23	48.12	Subscription	Completed	Credit Card	2023-09	2023-01	2023-09
CUST_00000	CUST_00000	10/28/23	69.56	Subscription	Completed	Credit Card	2023-10	2023-01	2023-10
CUST_00000	CUST_00000	11/28/23	45.58	Subscription	Completed	ACH	2023-11	2023-01	2023-11
CUST_00000	CUST_00000	12/28/23	51.68	Subscription	Completed	ACH	2023-12	2023-01	2023-12

Monthly revenue

year_month	total_revenue	num_transac	avg_transact	unique_customers	revenue_growth	month	quarter	is_q4
1/1/20	21878.65	97	225.553093	97		1	1	0
2/1/20	42934	173	248.17341	173	96.2369707	2	1	0
3/1/20	55509	239	232.25523	239	29.2891415	3	1	0
4/1/20	75856.8	314	241.582166	314	36.6567584	4	2	0
5/1/20	104698.22	409	255.985868	409	38.0208762	5	2	0
6/1/20	118719.53	479	247.848706	479	13.3921188	6	2	0
7/1/20	136785.25	560	244.259375	560	15.2171425	7	3	0
8/1/20	152817.37	639	239.150814	639	11.7206497	8	3	0
9/1/20	173125.54	714	242.472745	714	13.2891765	9	3	0
10/1/20	192940.47	784	246.097538	784	11.4454112	10	4	1
11/1/20	204928.68	845	242.519148	845	6.21342428	11	4	1
12/1/20	233216.37	928	251.310744	928	13.8036755	12	4	1

Example 1

1. Revenue Forecasting “Predicting the company’s income”

Look at last month’s sales?

That’s correct: Revenue forecasting means **predicting future earnings** using past data. It helps businesses plan budgets, set goals, and make smarter investments.

Example:

- If Netflix sees that subscriptions usually increase by 10% during holidays, it can **forecast** higher revenue in December.
- If a SaaS company earns \$100,000 this month and has been growing 5% each month, it can **predict \$105,000** next month.

Common tools & methods:

ARIMA or Prophet models : help predict future trends from past data.

Exponential smoothing : gives more weight to recent data.

Seasonality checks : catch repeating patterns (like holiday spikes).

Example 2

2. Churn Analysis — “Why customers leave you”

That's Churn: **Customer churn** means customers who **stop buying or unsubscribe**. **Churn analysis** helps find out:

- Who is likely to leave?
- Why they might leave?
- What can we do to keep them?

Example:

- A telecom company notices customers with frequent network issues are leaving.
- A bank sees users with low account activity eventually close their accounts.

Common tools & methods:

- **Logistic Regression:** Predicts yes/no: will this customer churn?
- **Random Forest & Gradient Boosting:** Advanced models that find hidden churn signals.
- **RFM & Cohort Analysis:** Groups customers by behavior and tracks retention.

Example 3

3. Profitability Analysis — “Where are we really making (or losing) money?”

Exactly — revenue \neq profit.

it measures which customers, products, or regions **actually bring profit**, and which are **costing money**.

- A company finds small customers generate lots of support tickets → low profit.
 - Premium clients bring fewer issues but higher revenue → high profit.
- So they decide to **focus on high-value clients**.

Tools & techniques:

- **Regression models** : Understand what drives profit.
- **Feature importance** : Identify which factors (cost, discount, marketing spend) impact profit.
- **Monte Carlo Simulation** : Test “what if” profit scenarios (e.g., if prices change).

Real-world mini-examples for class discussion

Scenario	Technique	Questions?
Netflix wants to predict next month's subscribers	Revenue Forecasting	What data would you use?
A bank is losing customers after fee increase	Churn Analysis	How can they detect this early?
An e-commerce store sells hundreds of items but low margin	Profitability Analysis	How can they find what's really profitable?

Analytics Techniques Covered

Time Series Analysis

- └— ARIMA/SARIMA Models
- └— Facebook Prophet
- └— Exponential Smoothing
- └— Seasonality

Decomposition Regression Analysis

- └— Linear Regression (Revenue Drivers)
- └— Logistic Regression (Churn Prediction)
- └— Random Forest & Gradient Boosting
- └— Feature Importance Analysis

Cohort & Retention Analysis

- └— Cohort-based Revenue Tracking
- └— Retention Rate Calculations
- └— Customer Lifetime Value (CLV)
- └— RFM Segmentation

Advanced Techniques

- └— Customer Segmentation (K-Means)
- └— Survival Analysis
- └— Monte Carlo Simulation



Project Workflow

Phase 1: Data Acquisition & Understanding

- └— Load financial transaction data
- └— Data quality assessment
- └— Exploratory data analysis
- └— Define business questions

Phase 2: Data Preprocessing

- └— Handle missing values & outliers
- └— Feature engineering
- └— Time series preparation
- └— Create cohort structures

Phase 3: Revenue Forecasting

- └— Time series decomposition
- └— ARIMA/Prophet modeling
- └— Model validation & selection
- └— Generate forecasts with confidence intervals

Phase 4: Churn Analysis

- └— Define churn metrics
- └— Build predictive models
- └— Calculate CLV
- └— Risk stratification

Phase 5: Profitability & Cohort Analysis

- └— Customer segmentation
- └— Cohort retention analysis
- └— RFM analysis
- └— Profitability optimization

Phase 6: Reporting & Documentation

- └— Executive dashboard
- └— Business recommendations
- └— GitHub documentation

Deliverables

Technical Deliverables

- Clean, documented Python code
- Professional visualizations
- 3 trained ML models (ARIMA, Prophet, Random Forest)
- Interactive dashboards
- Comprehensive Jupyter notebooks

Business Deliverables

- Revenue forecast: Next 12 months
- Churn prediction model: >75%+ accuracy
- Customer segments: 5-7 actionable groups
- Profitability analysis by cohort
- Executive summary report

Documentation

- GitHub repository with README
- Technical methodology document
- Business insights presentation
 - Data dictionary
- Model performance reports

Expected Outcomes & Skills

Technical Skills

- Time series forecasting (ARIMA, Prophet, SARIMA)
- Advanced regression techniques
- Customer analytics (CLV, RFM, cohorts)
- Data visualization mastery
- Model evaluation & selection

Business Skills

- Financial metrics interpretation
- Strategic recommendations
- Stakeholder communication
- ROI quantification
- Data-driven decision making

Career Impact

- Portfolio-ready project for interviews
- Real-world business problem solving
- End-to-end analytics experience
- GitHub presence for recruiters
- Presentation-ready materials

GitHub

📁 Project Overview

A comprehensive end-to-end financial analytics project covering revenue forecasting,

🎯 Business Objectives

1. **Revenue Forecasting** - Predict future revenue with 90%+ accuracy using time series models
2. **Churn Prediction** - Identify at-risk customers before they leave
3. **Profitability Analysis** - Segment customers and optimize resource allocation
4. **Cohort Analysis** - Track customer behavior and retention over time

💡 Key Results

- 📈 **Revenue Forecast**: \${forecast.sum():.0f} predicted for next 12 months
- 🎯 **Churn Model Accuracy**: {churn_results[best_churn_model_name]['roc_auc']:.1%}
- 💰 **Identified Value**: \${at_risk_mrr * 12:.0f} annual revenue at risk
- 👥 **Customer Segments**: {optimal_k} distinct groups with targeted strategies

📁 Project Structure

financial-operations-analytics/

├── financial_customers.csv # Customer master data
├── financial_transactions.csv # Transaction history
└── monthly_revenue.csv # Aggregated monthly metrics

├── financial_analytics.py # Complete analysis script
├── EXECUTIVE_SUMMARY_FINANCIAL.txt # Executive report
└── kpi_summary.txt # Key metrics summary

├── at_risk_customers.csv # High churn risk list
└── rfm_segmentation.csv # RFM customer segments

└── financial_viz/ # All visualizations (16 files)

├── 01_initial_exploration.png
├── 02_ts_decomposition.png
├── 03_acf_pacf_analysis.png
├── 04_arima_forecast.png
├── 05_prophet_forecast.png
├── 06_prophet_components.png
├── 07_churn_analysis.png
├── 08_churn_model_evaluation.png
├── 09_churn_feature_importance.png
├── 10_risk_stratification.png
├── 11_cohort_retention.png
├── 12_revenue_cohorts.png
├── 13_rfm_analysis.png
├── 14_clv_analysis.png
├── 15_profitability_dashboard.png
└── 16_FINAL_EXECUTIVE_DASHBOARD.png

├── README.md # This file
└── requirements.txt # Python dependencies