Approach Churn analysis

📈 Approach & Methodology

1. Data Source & Business Context

- **Dataset:**
    - Sourced from [Telco Customer Churn](#)
    - Includes customer demographics, service usage, contract/payment details, churn status, and revenue.
- **Business Goal:**
    - Identify churn drivers, quantify revenue at risk, and recommend actionable retention strategies for a telecom operator.

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2. SQL Data Cleaning & ETL

Why SQL?
SQL Server enables robust, repeatable data cleaning and integrity for large datasets.

Key Steps:

- **Database Setup:**
    - Created `db_Churn` database in SQL Server Management Studio (SSMS).
- **Data Import:**
    - Imported Kaggle CSV into a staging table (`stg_Churn`) using the Import Wizard.
    - Set `Customer_ID` as primary key; allowed nulls for all other columns.
    - Changed BIT columns to VARCHAR(50) to avoid import errors.
- **Data Exploration:**
    - Used SQL queries to count distinct values, check for nulls, and profile data quality.
    - Example: sql `SELECT Gender, COUNT(*) AS TotalCount FROM stg_Churn GROUP BY Gender; SELECT SUM(CASE WHEN Gender IS NULL THEN 1 ELSE 0 END) AS NullGender FROM stg_Churn;`
- **Null Handling & Production Table:**
    - Created `prod_Churn` table with cleaned data, replacing nulls using `ISNULL()` (e.g., `ISNULL(Value_Deal, 'None')`).

- Example: sql `SELECT Customer_ID, ISNULL(Value_Deal, 'None') AS Value_Deal, ISNULL(Multiple_Lines, 'No') AS Multiple_Lines, ISNULL(Churn_Category, 'Others') AS Churn_Category, ISNULL(Churn_Reason, 'Others') AS Churn_Reason, ... INTO prod_Churn FROM stg_Churn;`
- **Views for Power BI:**
  - Created views for filtered analysis: sql `CREATE VIEW vw_ChurnData AS SELECT * FROM prod_Churn WHERE Customer_Status IN ('Churned', 'Stayed'); CREATE VIEW vw_JoinData AS SELECT * FROM prod_Churn WHERE Customer_Status = 'Joined';`

For full SQL steps and queries, see:

- SQL-step.docx

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3. Power BI Data Modeling

- **Data Load:**
  - Connected Power BI to SQL Server, loaded `prod_Churn` and reference tables.
- **Power Query Transformations:**
  - Added columns:
    - `Churn Status` (1 = churned, 0 = active)
    - `Monthly Charge Range` (e.g., <20, 20–50, 50–100, >100)
  - Created reference tables:
    - `mapping_AgeGrp` (age buckets)
    - `mapping_TenureGrp` (tenure buckets)
  - **Unpivoted Service Columns:**
    - Created `prod_Services` by unpivoting service columns for matrix analysis.

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4. Measures & KPI Logic

All measures are housed in a dedicated `tbl_measures` table for maintainability.

KPI / Measure	DAX Formula (simplified)	Why It Matters
Total Customers	`COUNT(prod_Churn[Customer_ID])`	Base for all churn/retention analysis

KPI / Measure	DAX Formula (simplified)	Why It Matters
Total Churned	`SUM(prod_Churn[Churn Status])`	Direct measure of customer loss
New Joiners	`CALCULATE(COUNT(prod_Churn[Customer_ID]), prod_Churn[Customer_Status]="Joined")`	Growth/acquisition metric
Revenue at Risk	`CALCULATE(SUM(prod_Churn[Total_Revenue]), prod_Churn[Churn Status]=1)`	Quantifies financial impact of churn
Churn Rate	`[Total Churned] / [Total Customers]`	Industry-standard retention metric
Churned Customers by Reason	`CALCULATE(SUM(prod_Churn[Churn Status]), prod_Churn[Churn_Category]=...)`	Identifies main churn drivers
Churn Rate by Segment	`DIVIDE(CALCULATE(COUNTROWS(prod_Churn), prod_Churn[Churn Status]=1), COUNTROWS(prod_Churn))`	Segment-specific risk
Revenue at Risk by Segment	`CALCULATE(SUM(prod_Churn[Total_Revenue]), prod_Churn[Churn Status]=1, [Segment Filter])`	Prioritizes high-value retention

5. Chart Choices & Rationale

Chart Title	Visual Type	Business Question Answered
Churned Customer by Churn Reason Category	Horizontal Bar	What are the main reasons for churn?
Churn Rate by Payment Method and Contract	Grouped Bar	Which payment/contract combos are riskiest?
Top 5 States by Churn Rate	Horizontal Bar	Where is churn risk highest geographically?
Total Customers and Churn Rate by Charge	Combo (Bar+Line)	How does price relate to churn?
Churn Rate and Avg Revenue by Contract	Combo (Bar+Line)	Which contracts are most/least profitable?
Monthly Churn, New Joiners & Churn Rate	Combo (Bar+Line)	How does churn evolve over tenure?

Chart Title	Visual Type	Business Question Answered
Customer Distribution and Churn Rate by Tenure	Combo (Bar+Line)	Which tenure groups are most at risk?
Service Adoption and Churn Distribution	Matrix	How does service usage relate to churn?

6. Custom Tooltips

Why Tooltips?

- Deliver segment-specific KPIs (churn rate, revenue at risk, etc.) on hover.
- Enable micro-segment analysis and executive storytelling without clutter.

How Tooltips Were Built:

- Each tooltip is a dedicated Power BI page (Page Size: Tooltip, "Allow use as tooltip" enabled).
- Uses cards, tables, and DAX measures filtered by the hovered element.
- Assigned to main visuals via Format > Tooltip > Report Page.

Examples:

- **Churn Reason Bar Chart Tooltip:**
  - Churned customers, % of total churn, sub-reason breakdown, revenue at risk.
- **Payment Method & Contract Chart Tooltip:**
  - Churn rate, churned customers, total customers, revenue at risk for each combo.
- **State Churn Rate Tooltip:**
  - Churn rate, churned customers, revenue at risk, % of total churn for the state.
- **Service Adoption Matrix Tooltip:**
  - Service name, status, churned customers, revenue at risk for each cell.

Dashboard Filters & Their Significance

The dashboard includes interactive filters to enable users to slice and analyze churn by key customer segments. These filters empower business users and analysts to drill down into the data and uncover actionable insights for targeted retention strategies.

Filter Name	Description / Values	Business Significance
Internet Type	All, [Fiber Optic, DSL, etc.]	Analyze churn and revenue risk by internet service type. Identifies if certain technologies are more prone to churn.
Contract	All, [Month-to-Month, One Year, Two Year]	Assess churn risk and customer loyalty by contract length. Reveals impact of contract flexibility on retention.
Payment Method	All, [Mailed Check, Bank Withdrawal, Credit Card, etc.]	Pinpoint high-risk payment methods. Supports campaigns to promote digital payments for better retention.
Monthly Charge Status	All, [<20, 20–50, 50–100, >100]	Examine price sensitivity and identify pricing bands with highest churn or revenue at risk. Guides pricing and value strategy.
Tenure Group	All, [<6 Months, 6–12, 12–24, ≥24]	Analyze churn patterns across the customer lifecycle. Supports onboarding and re-engagement strategies.

Why these filters matter:

- They allow for **micro-segmentation**—so you can identify not just who is churning, but which combinations of contract, payment, price, and tenure are most at risk.
- Enable **targeted, data-driven retention and upsell actions** (e.g., focusing on new Month-to-Month customers paying by Mailed Check).
- Support **self-service analytics** for executives and business users, making the dashboard interactive and actionable.

8. References & Supporting Files

- Dataset
- SQL-step.docx: Full SQL ETL and cleaning process
- Dashboard