**1. Customer Lifetime Value (LTV) Scoring Using RFM Metrics**

**What it is:**

LTV predicts the total value a customer brings over their entire relationship with your business. Here, you compute a simple **LTV score** using the classic RFM model:

* **Recency (R):** How recently the customer bought.
* **Frequency (F):** How often they buy.
* **Monetary (M):** How much money they spend.

The Python script normalizes these metrics between 0 and 1 and combines them with weights into one score.

**Why use it:**

* Helps prioritize marketing efforts and retention strategies.
* Identify high-value customers to upsell or reward.
* Spot low-value or at-risk customers for targeted campaigns.

**How it works:**

* Tableau calculates basic fields:
  + **Days Since Last Purchase:** TODAY() - MAX([Order Date]) per customer.
  + **Order Count:** Number of orders per customer.
  + **Monetary:** Total sales per customer.
* Pass these to Python via SCRIPT\_REAL.
* Python normalizes and weights them to output a single **LTV score** per customer.
* Tableau visualizes customers colored by LTV score or filters on top customers.

**Business impact:**

* Improves customer segmentation beyond simple sales totals.
* Data-driven targeting increases ROI on marketing spend.
* Enables proactive customer management.

**2. Churn Prediction Proxy Using Sales Moving Average & Threshold**

**What it is:**

A simple rule-based churn signal that flags customers (or products/regions) whose recent sales dropped below half their recent average sales — indicating potential churn or sales decline.

**Why use it:**

* Quick and interpretable proxy for churn without complex ML models.
* Early warning system for sales drops or customer inactivity.
* Works with just historical sales data.

**How it works:**

* Takes time series of sales per customer/product/region.
* Computes a 3-period moving average with numpy.
* Flags periods where sales fall below 50% of this average.
* Returns 1 for high churn risk, 0 otherwise.
* Tableau uses this as color, filter, or KPI.

**Business impact:**

* Helps sales or account managers focus on customers/products at risk.
* Enables timely interventions — calls, offers, or promotions.
* Supports continuous monitoring on dashboards.

**3. Profit Trend Slope Calculation Using Linear Regression**

**What it is:**

Calculates the **linear slope** of profit over time (days, months, or quarters), per dimension like region or category. Positive slope means profit is increasing; negative means declining.

**Why use it:**

* Quickly identify improving or deteriorating business areas.
* Supports data-driven decisions like investing more in growing regions.
* Detect problems early if profit trends go negative.

**How it works:**

* Tableau passes the profit values ordered by time.
* Python uses numpy’s polyfit to fit a linear model and get slope.
* Returns slope value repeated to all rows for easy visualization.
* Tableau can color code or filter on slope.

**Business impact:**

* Provides actionable insights on performance trends.
* Supports performance reviews or operational adjustments.
* Enhances dashboards with trend direction indicators.

**Summary**

| **Use Case** | **Business Goal** | **Python Role** | **Tableau Role** |
| --- | --- | --- | --- |
| **LTV Scoring** | Identify high-value customers | Normalize + weight RFM scores | Visualize & segment customers |
| **Churn Proxy** | Detect sales/customer drop-off | Moving average + threshold | Flag & highlight at-risk units |
| **Profit Trend Slope** | Spot improving/deteriorating profit areas | Linear regression slope | Show trend direction & magnitude |

**How these fit in your Tableau workflow:**

1. **Calculate base metrics** in Tableau first (days since purchase, counts, sums).
2. **Pass these metrics to Python scripts via SCRIPT\_REAL**, SCRIPT\_INT, or SCRIPT\_BOOL.
3. Python returns advanced calculated fields that Tableau can use like any other calculated field.
4. Build visualizations with color, filters, sorting, or KPI indicators based on these fields.
5. Use these to support decision-making, targeting, or trend analysis in real time.