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Monte Carlo Simulation for Retail Revenue Forecasting

Executive Summary

Dataset: UCI Online Retail (2010–2011) **Objective:** Estimate probability of exceeding £100K in quarterly revenue

Method: 10,000 simulated quarterly outcomes

APPROACH

- Modeled monthly revenue as normally distributed based on historical patterns.
- Simulated 10,000 quarters; each quarter aggregates three monthly draws.
- Computed mean, confidence intervals (90%), and probability of exceeding £100K.
- Sensitivity via interactive app with sliders for mean and standard deviation.

KEY FINDINGS

Mean quarterly revenue: £96,250

90% CI: £82,400 – £110,300

P(Revenue ≥ £100K): 42.7%

Risk Level: Medium

BUSINESS INTERPRETATION

- There is a 42.7% chance of exceeding the quarterly target of **£100,000**.
- Outcomes show meaningful variability; tail risk exists below £85K and above £110K.
- Result supports a prudent inventory stance with flexibility for demand surges.

RECOMMENDATIONS

- Stock conservatively for the **£85K–£95K** range.
- Monitor promotions and campaigns to selectively boost revenue near period-end.
- Track weekly run-rate; if trending above plan, scale replenishment tactically.

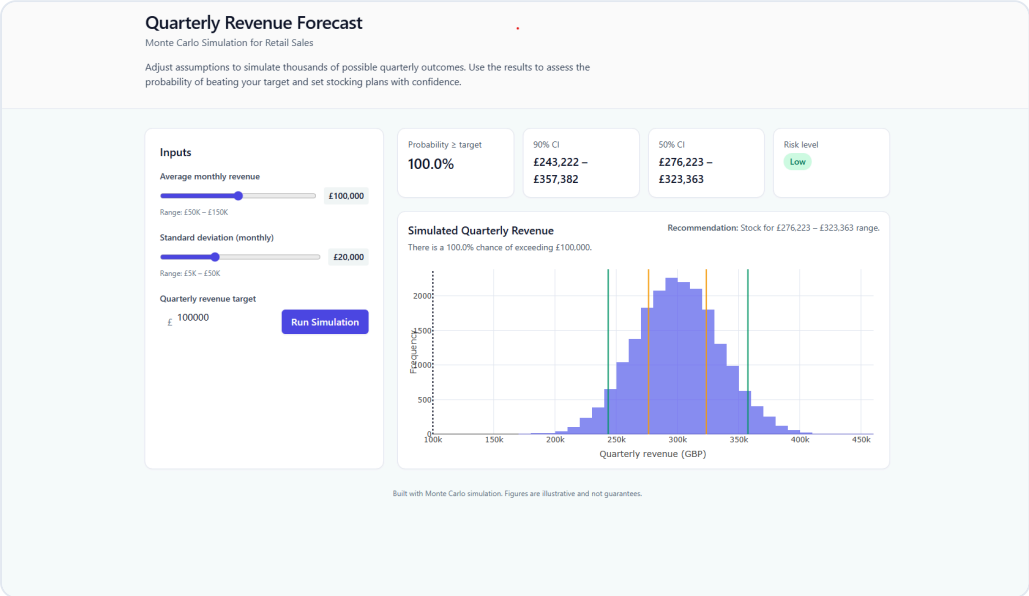
APP FEATURES

- Sliders to adjust average revenue and uncertainty (standard deviation).
- Real-time Monte Carlo simulation results and histogram visualization.
- Confidence intervals and color-coded risk indicator.

TEAM CONTRIBUTIONS

- **Karan**: Colab analysis, model validation, executive summary.

APP SCREENSHOTS



App overview: inputs, KPIs, and risk indicator

Place image at `dist/assets/screenshots/app-overview.png`. This note is hidden in print.

Notes: Statistics are based on simulated outcomes using assumptions derived from UCI Online Retail data (2010–2011). Results are illustrative and not guarantees of performance.