

Capstone Project Weekly Report

Date: 19 Oct 2025

Project Details:

1. Sponsor Company: AiSPRY
2. Project Title: Inventory Optimization Replenishment Simulation for Hospital Pharmacy

Note: All the fields in the form are required.

Project Milestones:

Progress made in Current Week:

1. Forecasting Model

- Forecasting model has been completed

2. Dashboard

- Dashboard has been completed
- Data Pipeline has been created

3. Model Validation & Refinement

- Validate the model on complete dataset, for all SKUs
- Create graphs of SKU's and check if values are coming as per requirements

Tasks to finish in Next week:

- Implement **model registry** and CI/CD pipeline for version control.
- Store all model experiments and best-performing models systematically.
- Explore **ensemble regression** to combine outputs from different models.
- Extend forecasting horizon and make outputs available on the dashboard.
- Professor to share PPT on hybrid/ensemble modelling for reference.
- Create a structure of documentation that needs to be submitted as part of report

Updates/MoM from Sponsor and Faculty Mentor:

Note: It is expected that you have at least one weekly connect with the faculty mentor and sponsor. If you were not able to schedule meetings with the sponsor or faculty mentor in the current week, please mention the reason for your inability to meet with the Sponsor or Faculty Mentor.

Meeting Sunday October 19, 2025:

Key Discussions

- **Advanced Modeling Approaches:**
 - Suggested exploring additional model categories — statistical (e.g., additive seasonality), data-driven (XGBoost/Random Forest), deep learning (RNN, LSTM, GRU), and transformer-based (TFT).
 - Recommended combining the best model from each category to form a **hybrid ensemble model** for improved accuracy.
- **Clustering:**
 - Current clusters based on domain knowledge (ABC/VED).
 - Suggested trying **latent clustering techniques** to uncover hidden data patterns and improve forecasting precision.
- **Model Management & Deployment:**
 - Advised implementing a **model registry** to track experiments, algorithms, and hyperparameters.
 - Best model should be stored in standard formats (e.g., .pkl, .h5, .onnx).
 - Recommended automating retraining and deployment via **CI/CD pipeline** (MLflow, DVC, GitHub).
- **Forecasting Automation:**
 - Current process retrains the model monthly; discussed extending to **multi-horizon forecasts** (weekly, quarterly, yearly).
 - Suggested saving all model outputs for flexible forecasting across different time ranges.
- **Ensemble & Regression Combination:**
 - Professor advised using **weighted regression (no intercept)** to combine forecasts from multiple models.
 - Coefficients should sum close to 1 for valid ensemble weighting.

Decisions & Next Steps

- Implement **model registry** and CI/CD pipeline for version control.
- Store all model experiments and best-performing models systematically.
- Explore **ensemble regression** to combine outputs from different models.
- Extend forecasting horizon and make outputs available on the dashboard.
- Professor to share PPT on hybrid/ensemble modeling for reference.

Updates/MoM from Sponsor:

Updates/MoM from Faculty Mentor:

Same as MoM with Sponsor. Had a common meeting with Professor and Sponsor

Challenges:

Mention any technical and non-technical challenges that you faced during the current week that hindered your project progress. Enter "NA" if you didn't face any challenges.

Technical Challenges:

NA

Non-Technical Challenges:

NA

Mention any other queries/challenges regarding the project that you want to highlight:

NA