**STEP 1: PROBLEM IDENTIFICATION**

**INNOVATION OBJECTIVE**: Create a predictive model to forecast COVID-19 cases for a specific region.

**SPECIFICS:**  Let's say you want to predict COVID-19 cases in a particular country or region over the next 30 days.

**STEP 2: DATA COLLECTION AND AUGMENTATION**

- Collect daily COVID-19 cases and relevant data for the target region.

- Augment your dataset with additional data sources such as population density, healthcare capacity, and vaccination rates.

**STEP 3: DATA PREPROCESSING**

- Clean the data to handle missing values, duplicates, and inconsistencies.

- Create time series data with features like daily cases, testing rates, and past interventions.

**STEP 4: MODEL SELECTION**

- Choose three Machine Learning models for time series forecasting. Let's select:

1. ARIMA (AutoRegressive Integrated Moving Average) Model

2. Prophet Model

3. Long Short-Term Memory (LSTM) Neural Network Model

**STEP 5: TRAINING DATA SPLIT**

- Split your dataset into training, validation, and testing sets. For instance, you can use a 70-15-15 split.

**STEP 6: MACHINE LEARNING MODEL TRAINING**

- Train each model using the training dataset.

- Tune model hyperparameters and architectures for optimal performance.

**STEP 7: MODEL EVALUATION**

- Evaluate the models on the validation and testing datasets using Mean Absolute Error (MAE) as the evaluation metric.

**STEP 8: HYPERPARAMETER TUNING**

- Perform hyperparameter tuning to optimize model performance. Use techniques like grid search or Bayesian optimization.

**STEP 9: MODEL SELECTION**

- Select the best-performing model based on the MAE on the validation set.

**STEP 10: MODEL DEPLOYMENT**

- Deploy the selected model within your COVID-19 analysis tool.

**STEP 11: CONTINUOUS LEARNING**

- Implement a system for continuous learning, where the model is retrained periodically with new data to adapt to changing trends.

**STEP 12: USER FEEDBACK LOOP**

- Maintain a feedback loop with users and stakeholders to gather insights into the effectiveness of the predictive model.

**STEP 13: INNOVATIVE FEATURES**

- Introduce innovative features, such as real-time forecasting, uncertainty estimation, or alerts for potential outbreaks.

**STEP 14: VISUALIZATION OF ML RESULTS**

- Develop a dynamic dashboard that displays the model's predictions and confidence intervals in real-time.

**STEP 15: ETHICAL CONSIDERATIONS**

- Ensure ethical considerations and data privacy regulations are strictly followed when handling sensitive healthcare data.

**STEP 16: DOCUMENTATION AND USER GUIDANCE**

- Create documentation for users to understand how to interpret and utilize the model's predictions effectively.

**STEP 17: INNOVATION SHOWCASE**

- Consider showcasing your innovative use of predictive modeling at relevant conferences or forums to share your findings and approaches.

**AVERAGE MODEL ACCURACY:**

- After evaluating the three models (ARIMA, Prophet, LSTM) on the testing dataset, let's assume the average MAE is as follows:

- ARIMA: MAE = 500 cases

- Prophet: MAE = 400 cases

- LSTM: MAE = 300 cases

These MAE values represent the average prediction error for each model. The lower the MAE, the more accurate the model's predictions.