**AML ML Model Monitoring: Key Terminology & Definitions**

1. **AML (Anti-Money Laundering):**
   * **Meaning:** A set of regulations, laws, and procedures designed to prevent criminals from disguising illegally obtained funds as legitimate income. It involves various processes, including customer due diligence, transaction monitoring, and suspicious activity reporting.
2. **ML (Machine Learning):**
   * **Meaning:** A branch of artificial intelligence that enables systems to learn from data, identify patterns, and make decisions with minimal human intervention. In this project, ML models are used for tasks like sanctions screening, transaction monitoring, and risk scoring.
3. **Model Monitoring:**
   * **Meaning:** The continuous process of observing and tracking the performance, health, and behavior of deployed machine learning models in a production environment. Its goal is to ensure models remain accurate, reliable, and effective over time.
4. **KPI (Key Performance Indicator):**
   * **Meaning:** Quantifiable measures used to evaluate the success and effectiveness of a model or process. For ML models, these include metrics like Precision, Recall, F1-Score, and AUC-ROC, as well as business metrics like Alert Volume.
5. **Data Drift:**
   * **Meaning:** A change in the distribution of input data over time. If the characteristics of the data that the model receives in production diverge significantly from the data it was trained on, its performance can degrade.
6. **Concept Drift:**
   * **Meaning:** A change in the relationship between the input features and the target variable. This implies that the underlying "rules" or patterns that the model learned are no longer valid, often due to evolving real-world behavior (e.g., new methods of money laundering).
7. **False Positive (Type I Error):**
   * **Meaning:** An instance where the model incorrectly predicts a positive outcome (e.g., flags a customer or transaction as suspicious), but it is actually legitimate. In AML, this means a legitimate activity is flagged as suspicious.
8. **False Negative (Type II Error):**
   * **Meaning:** An instance where the model incorrectly predicts a negative outcome (e.g., fails to flag a customer or transaction as suspicious), but it is actually illicit. In AML, this is a critical miss, as it means a true suspicious activity goes undetected.
9. **Precision:**
   * **Meaning:** The proportion of positive predictions that were actually correct. In AML, it's the proportion of flagged alerts that were genuinely suspicious. A high precision reduces false positives.
10. **Recall (Sensitivity):**
    * **Meaning:** The proportion of actual positive cases that were correctly identified by the model. In AML, it's the proportion of all truly suspicious activities that the model managed to flag. A high recall reduces false negatives.
11. **F1-Score:**
    * **Meaning:** The harmonic mean of Precision and Recall. It provides a single score that balances both metrics, useful when you need to consider both false positives and false negatives.
12. **AUC-ROC (Area Under the Receiver Operating Characteristic Curve):**
    * **Meaning:** A performance metric for classification models that measures their ability to distinguish between classes across various classification thresholds. A higher AUC-ROC indicates better discriminatory power.
13. **Alert Volume:**
    * **Meaning:** The total number of alerts generated by the AML models within a specific period. Monitoring this helps assess the operational impact of the models on human analysts.
14. **Sanctions Screening:**
    * **Meaning:** The process of checking individuals, entities, or transactions against official sanctions lists (e.g., OFAC, UN) to prevent financial dealings with prohibited parties.
15. **Transaction Monitoring:**
    * **Meaning:** The ongoing process of scrutinizing customer transactions for suspicious patterns or anomalies that might indicate money laundering, terrorist financing, or other illicit activities.
16. **Risk Scoring:**
    * **Meaning:** The assignment of a numerical score or risk level to a customer, transaction, or entity based on a combination of factors, indicating their likelihood of being involved in illicit activities.
17. **Remediation:**
    * **Meaning:** The process of identifying and fixing issues detected by the monitoring system. In the context of ML models, this often involves re-training the model, recalibrating thresholds, or adjusting data pipelines.
18. **Production Environment:**
    * **Meaning:** The live, operational environment where the ML models are deployed and actively used to process real-world data and make predictions.
19. **Feature Engineering:**
    * **Meaning:** The process of transforming raw data into features (variables) that can be used by machine learning models. This is a critical step both in model training and real-time inference.
20. **Inference (or Prediction):**
    * **Meaning:** The process of using a trained machine learning model to make predictions or decisions on new, unseen data.
21. **MLOps (Machine Learning Operations):**
    * **Meaning:** A set of practices that combines Machine Learning, Development (Dev), and Operations (Ops) to standardize and streamline the lifecycle of ML models, from experimentation to deployment, monitoring, and maintenance in production.
22. **Regulatory Compliance:**
    * **Meaning:** Adherence to laws, regulations, guidelines, and specifications relevant to the **financial** industry and AML practices. Model monitoring is crucial for demonstrating compliance to regulatory bodies.
23. **Audit Trail:**
    * **Meaning:** A chronological record of activities that provides documentary evidence of the **sequence** of events. In model monitoring, this includes logs of model predictions, alerts, analyst dispositions, and remediation actions, crucial for regulatory scrutiny.
24. **Threshold:**
    * **Meaning:** A **predefined** boundary or level that, when crossed by a monitored metric, triggers an alert or specific action. For example, a "precision threshold" or an "anomaly score threshold."
25. **Baseline:**
    * **Meaning:** A reference point, often derived from historical data or initial model performance, against which current model performance, data distributions, or alert volumes are compared to detect deviations.
26. **Alert Triage:**
    * **Meaning:** The initial process of reviewing and prioritizing alerts generated by the monitoring system or AML models. It involves quickly assessing the validity and urgency of an alert before escalation.
27. **False Positive Rate (FPR):**
    * **Meaning:** The proportion of actual negative cases that were incorrectly identified as positive. It's FP / (FP + **TN**). Useful for understanding the burden of incorrect alerts.
28. **Model Degradation:**
    * **Meaning:** The decline in a machine learning model's performance over time when deployed in a production environment, often due to data drift, concept drift, or operational issues.
29. **Continuous Integration/Continuous Deployment (CI/CD) for ML:**
    * **Meaning:** An MLOps practice where code changes (CI) and model updates/deployments (CD) are automated, tested, and released frequently and reliably, often triggered by model retraining or code changes.
30. **Feature Store:**
    * **Meaning:** A centralized repository that standardizes the definition, storage, and access of features for machine learning models. It helps ensure consistency between features used for training and those used for real-time inference.
31. **Model Registry:**
    * **Meaning:** A centralized system for tracking, versioning, and managing ML models throughout their lifecycle. It **stores** metadata about models (e.g., version, metrics, training data, responsible team).
32. **Explainability (XAI - eXplainable AI):**
    * **Meaning:** The ability to understand *why* an AI model made a particular decision or **prediction**. In AML, this is critical for justifying alerts to compliance officers and regulators, and for enabling analysts to understand suspicious activity.
33. **Bias Detection:**
    * **Meaning:** The process of identifying unintended or unfair biases in machine learning models, often related to protected attributes (e.g., race, gender). Crucial for ethical AI and regulatory fairness.
34. **SAR (Suspicious Activity Report):**
    * **Meaning:** A mandatory report that financial institutions must file with a financial intelligence unit (e.g., FinCEN in the US) when they suspect a transaction or activity might involve money laundering or terrorist financing. The ultimate output of a confirmed AML alert.
35. **KYC (Know Your Customer) / CDD (Customer Due Diligence):**
    * **Meaning:** Processes used by financial institutions to verify the identity of their clients and assess their suitability and risk profiles. While not direct ML model outputs, they form critical input data for AML models and are part of the broader AML ecosystem.
36. **Model Versioning:**
    * **Meaning:** The practice of assigning unique identifiers to different iterations of an ML model, allowing tracking of changes, reproducibility, and enabling easy rollback to previous versions if needed.