PREVENTING PRODUCT LEAKAGE

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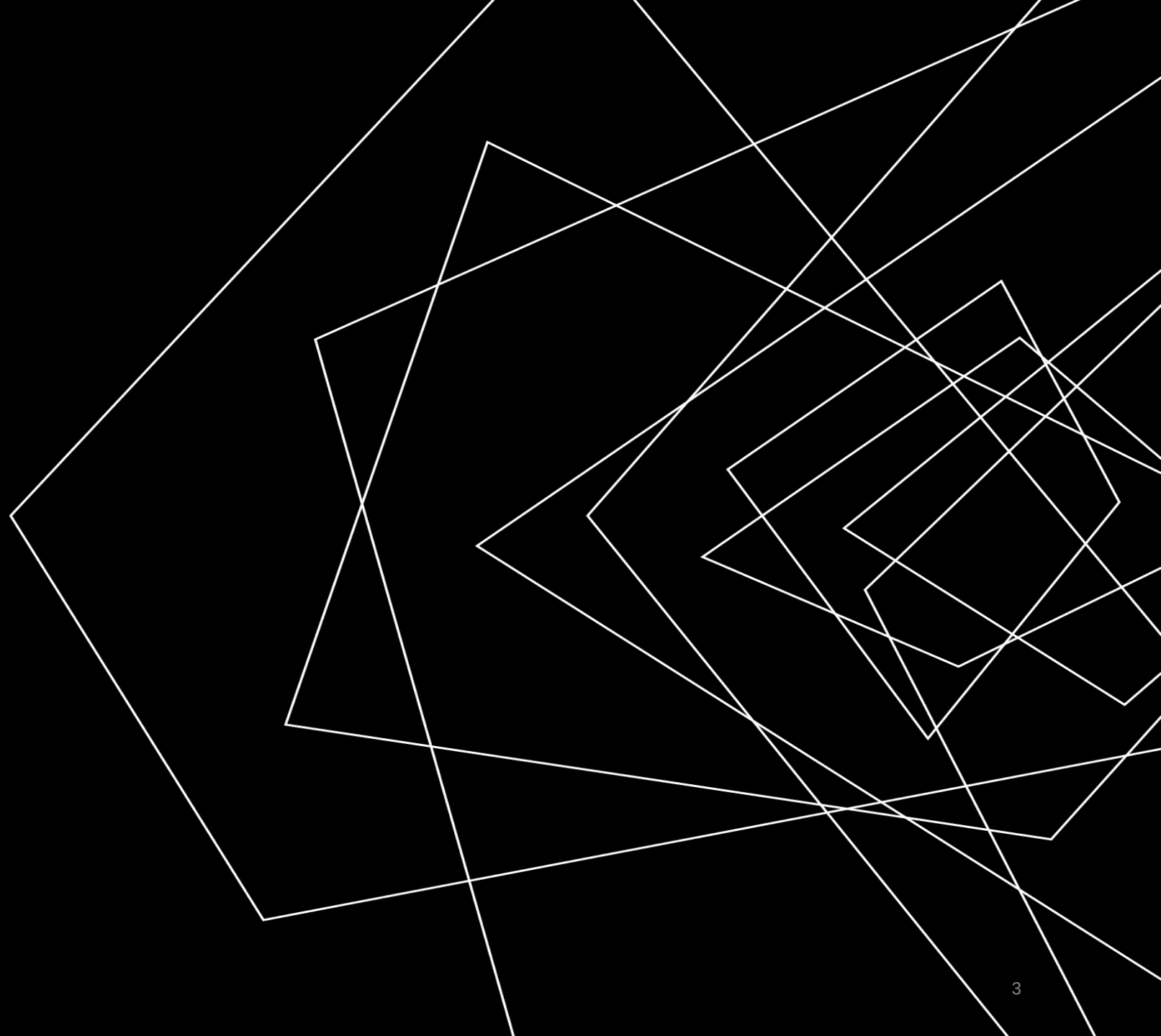
Visit my portfolio website:
https://hapeace.vercel.app

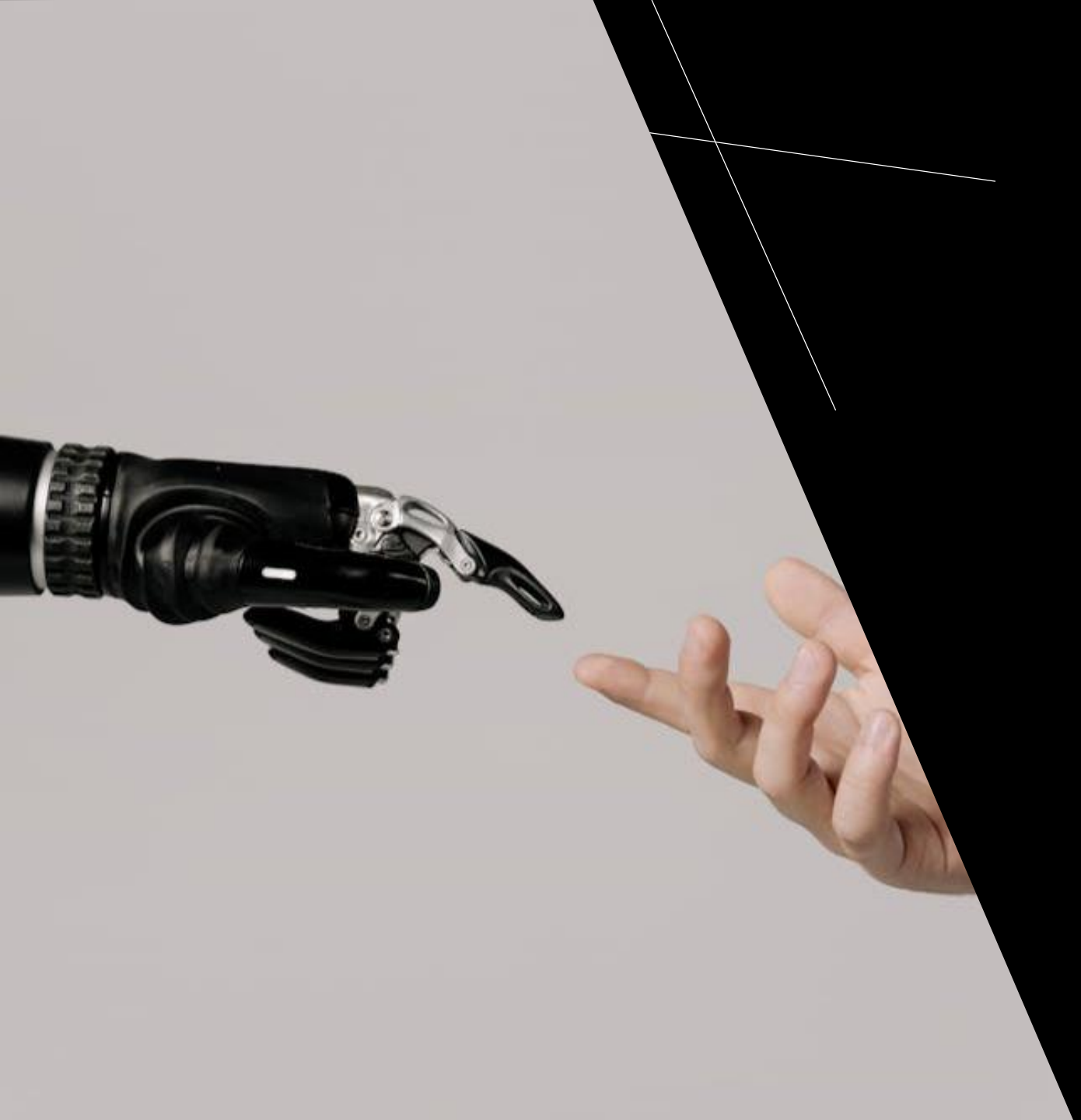
AGENDA

- Common Causes of Product Leaks
- Why Use Machine Learning?
- What Data Needed to Build Machine Learning Model?
- Data processing
- Workflow



COMMON CAUSES OF PRODUCT LEAKS

- Material packaging failure
- Errors in the production process (for example imperfect sealing)
- Overpressure on production lines
- Imbalance of liquid volume in packaging

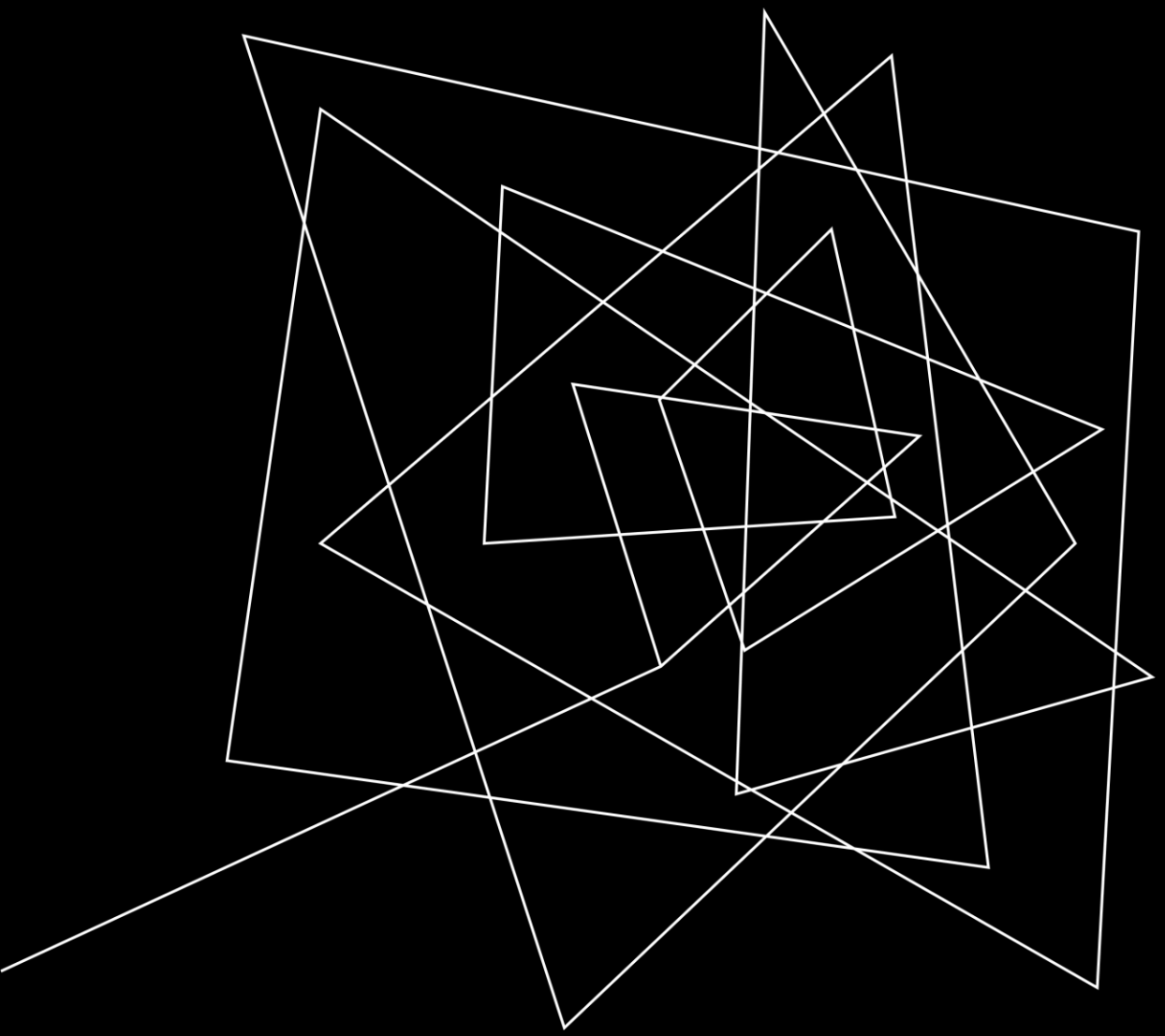


PREVENTING USING MACHINE LEARNING

WHY USE MACHINE LEARNING?

What are the benefits of implementing Machine Learning?

- Automatic and real-time leakage detection
- Increased efficiency and accuracy compared to manual methods
- Minimizing defective products and reducing production costs



WHAT DATA NEEDED TO BUILD MACHINE LEARNING MODEL?

SENSOR DATA AND PROCESSING TECHNIQUES

Required Data Types:

- **Pressure Sensor** → Measures pressure changes in the production pipeline
- **Temperature Sensor** → Detects temperature changes that may affect packaging
- **-**
- **-**
- **-**
- **Classification Data** → Labels data for product condition (whether it is leaking or not) (yes/no)

Data Processing Steps:

- **Data Collection**
- **Data Normalization**
- **Features Extraction**
- **Splitting data** for training and testing (80% training, 20% testing)

PRODUCTION PIPELINE

Sensor A

Sensor C

Sensor B

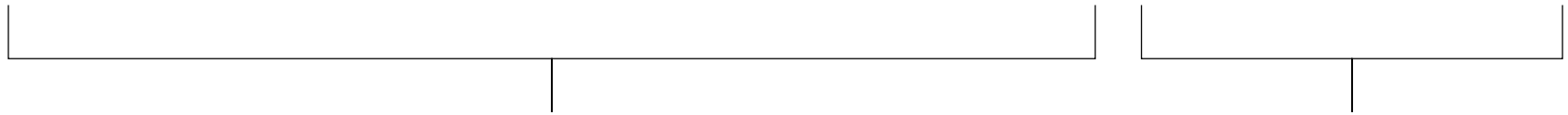
Sensor A = 2
Sensor B = 6
Sensor C = 9

BOCOR?

class
no
no
yes

DATASET LOOK LIKE

Nama Produk	Sensor Tekanan	Sensor Suhu	Datetime	class
Komix	1	1	2/15/2025 7:00	no
Bejo	2	2	2/15/2025 8:00	no
Komix	3	3	2/15/2025 9:00	yes



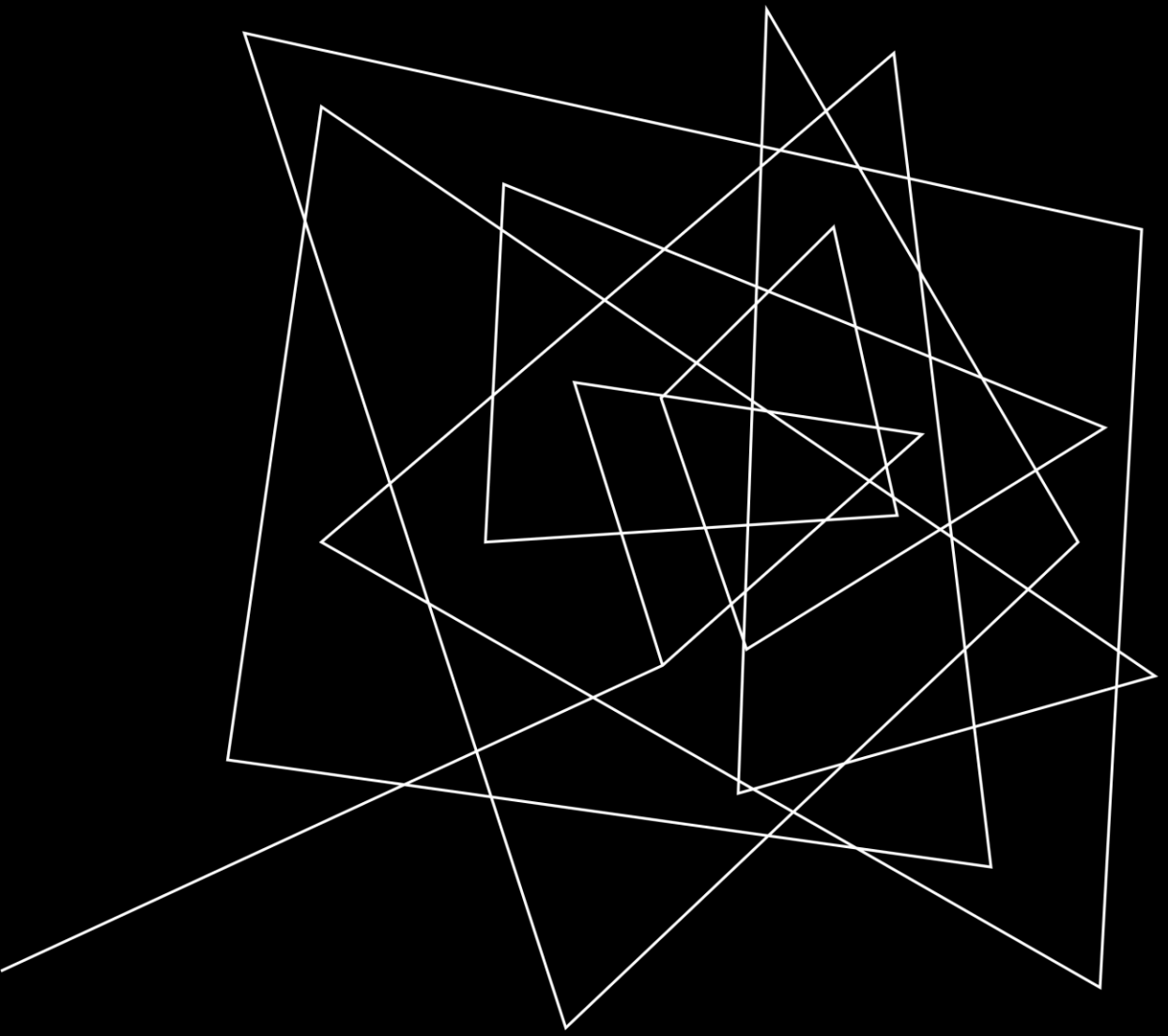
Features
(X)

Factors that affect product leakage

Target (y)

Label leakage
(y/n)

“ A GOOD MODEL COMES FROM GOOD DATA. “



TRAINING & EVAL PHASES

- Model training with various algorithms
- Model performance evaluation uses accuracy, recall, precision, and F-measure

ML Algorithms

XGBoost LightGBM

SVM Etc..

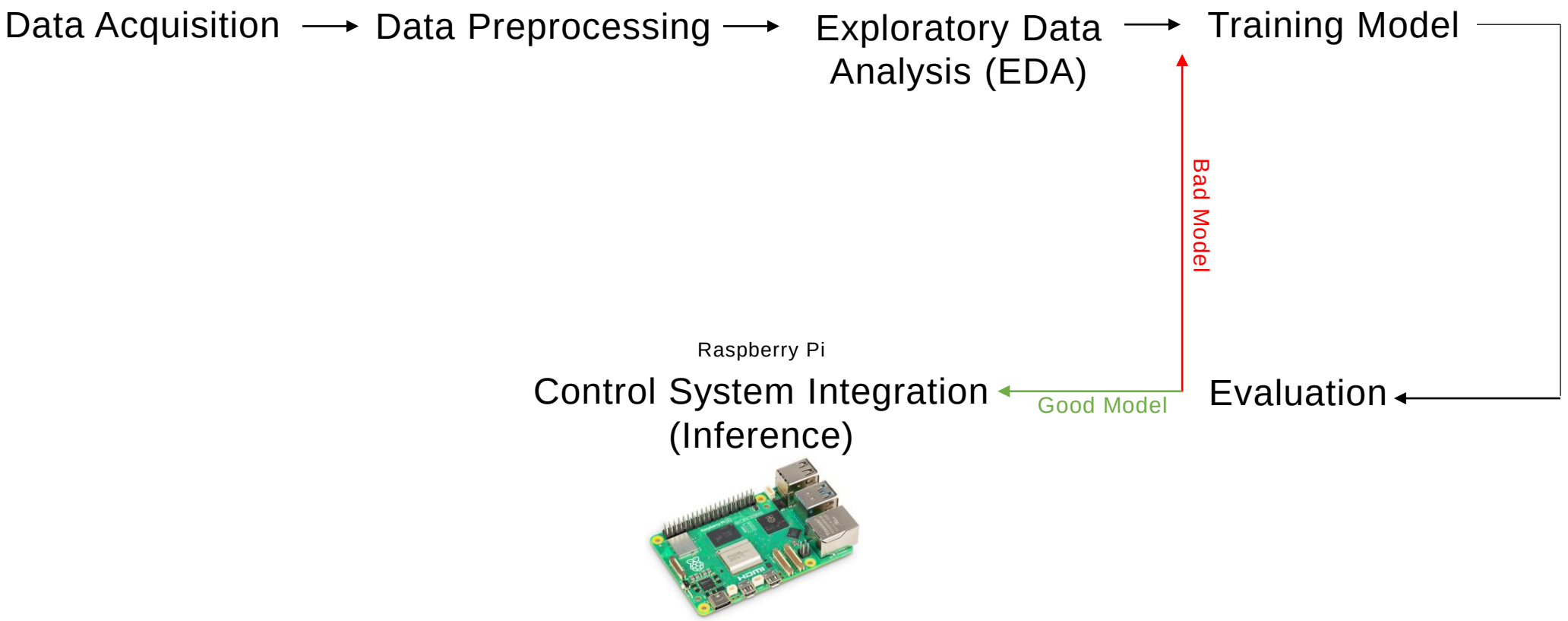
AFTER TRAINING MODEL WHAT SHOULD WE DO?

Integration with control systems for automatic preventive measures

For Example:

- Shutdown Automation
- Turn On the Alarm

WORKFLOW


Data Acquisition
Data Preprocessing
Exploratory Data Analysis (EDA)
Training Model
Bad Model
Raspberry Pi
Control System Integration (Inference)
Good Model
Evaluation

THANK YOU