

## 02.ML

### 1) Main idea: Clients don't say "prediction"

Clients usually talk in **business words**, like:

- "Prevent fraud"
- "Route emails to correct department"
- "Stop false transaction"
- "Reduce customer issues"

But inside AI, these are still **prediction problems**, because the system must decide something automatically.

Example:

- If transaction is fraud → **stop it**
- If not fraud → **allow it**

That "stop/allow" is the **action**, based on the prediction.

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### 2) The "3-stage thinking" (the core skill)

Before coding, you should identify these 3 stages:

#### Stage 1: What AI area is it?

- If input is **numbers / customer behavior / transaction data** → Machine Learning
- If input is **text (emails, messages)** → NLP (Natural Language Processing)

#### Stage 2: Which learning type?

- If you have **past data with labels** (fraud / not fraud, shipment / delivery / quality) → **Supervised Learning**
- If you have **no labels**, you're just grouping patterns → Unsupervised Learning

#### Stage 3: Regression or Classification?

- If output is a **category** (Fraud / Not Fraud, Shipment / Delivery / Quality) → **Classification**
- If output is a **number** (price, salary, amount) → Regression

So both examples in your content are:

✅ **Supervised + Classification**

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### 3) Example 1: XYZ Bank Fraud Prevention

**Problem:** “Prevent fraudulent transactions before they happen.”

What it really means:

- Predict: Fraud vs Not Fraud
- Then action: Stop transaction vs Continue

Dataset example:

- Inputs: amount, age, behavior, location, device, etc.
- Output label: fraud / non-fraud

So:

- Stage 1: Machine Learning
- Stage 2: Supervised
- Stage 3: Classification

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### 4) Example 2: E-commerce Email Routing

**Problem:** Thousands of emails go to one inbox, but should go to different departments.

What it really means:

- Predict department category: shipment / delivery / quality / etc.
- Then action: auto-forward email to correct team

Dataset example:

- Input: email text
- Output: department label

So:

- Stage 1: NLP
- Stage 2: Supervised
- Stage 3: Classification

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### 5) Simple Linear Regression part (end of your content)

It explains regression basics:

- Regression = predicting a **number**
- Simple linear regression = **one input → one output**
- Uses straight line equation:

$$Y = Mx + C$$

- Y = output (what you want to predict)
- X = input
- M = slope
- C = intercept/bias (starting point)

This part is separate from the fraud/email examples (those are classification).