Machine Learning – Source Code

Below are **basic Python examples** for each type of Machine Learning.

🧑‍🏫 1. Supervised Learning – Fruit Classification

👉 **Goal:** Predict whether a fruit is **Apple** or **Orange**
👉 **Algorithm:** Decision Tree

✅ Source Code

```
python

from sklearn.tree import DecisionTreeClassifier

# Features: [weight, sweetness]
X = [
    [150, 8],
    [170, 7],
    [140, 9],
    [200, 4],
    [220, 3],
    [210, 5]
]

# Labels
y = ["Apple", "Apple", "Apple", "Orange", "Orange", "Orange"]

# Create model
model = DecisionTreeClassifier()

# Train model
model.fit(X, y)

# Predict new fruit
prediction = model.predict([[160, 8]])
print("Predicted Fruit:", prediction)
```

🔍 Explanation

- `X` → Input features (weight, sweetness)
- `y` → Output labels (Apple / Orange)
- `fit()` → Training the model

- `predict()` → Predicting new data

🧩 2. Unsupervised Learning – Clustering Fruits

👉 **Goal:** Group fruits **without labels**
👉 **Algorithm:** K-Means Clustering

✅ Source Code

```
python

from sklearn.cluster import KMeans

# Data without labels
X = [
    [150, 8],
    [160, 7],
    [200, 3],
    [210, 4]
]

# Create KMeans model (2 clusters)
kmeans = KMeans(n_clusters=2, random_state=42)

# Train model
kmeans.fit(X)

# Predict cluster groups
clusters = kmeans.predict(X)
print("Cluster Assignments:", clusters)
```

🔍 Explanation

- No labels are given
- `n_clusters=2` → Number of groups
- Output shows which data belongs to which cluster

🎮 3. Reinforcement Learning – Simple Concept Code

👉 **Goal:** Learn by **trial and error**
👉 **Example:** Agent choosing actions

✅ Simple Python Example

```
python

import random

actions = ["left", "right"]
reward = 0

for step in range(10):
    action = random.choice(actions)

    if action == "right":
        reward += 1
        print("Step", step, ": Right → Reward +1")
    else:
        reward -= 1
        print("Step", step, ": Left → Reward -1")

print("Final Reward:", reward)
```

🔍 Explanation

- Agent randomly selects actions
- Good action → reward
- Bad action → penalty
- Learning improves over time (concept)

📦 Required Libraries

Install once before running code:

```
bash

pip install scikit-learn
```