"""

This file demonstrates:

1. Secure user data collection

2. Sentiment analysis with bias awareness

3. Fair product recommendation system

4. Ethical logging practices

5. Responsible ML model usage

Ethical Principles Followed:

- Privacy protection

- Bias awareness

- Transparency

- Fairness

- Responsible usage of AI outputs

"""

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TASK 1: USER DATA COLLECTION WITH PRIVACY

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"""PROMPT : "Generate a Python script that collects user name, age, and email.

Add comments on how to anonymize or protect this data."""

import hashlib

print("\n--- Task 1: User Data Collection with Privacy ---")

```
name = input("Enter your name: ")
age = input("Enter your age: ")
email = input("Enter your email: ")

# Hashing email to anonymize identity
hashed_email = hashlib.sha256(email.encode()).hexdigest()

# NOTE:
# - Do NOT store raw personal data
# - Hash or encrypt sensitive information
# - Collect minimum required data only

user_data = {
   "name": name,
   "age": age,
   "email_hash": hashed_email
}

print("Stored Secure User Data:", user_data)



# ------------------------------------------------
# TASK 2: SENTIMENT ANALYSIS WITH BIAS AWARENESS
# ------------------------------------------------
"""
```

```
Generate a Python function for sentiment analysis and include
comments to handle or reduce data bias.
"""
print("\n--- Task 2: Sentiment Analysis with Bias Awareness ---")

def analyze_sentiment(text):
    positive_words = ["good", "happy", "great", "excellent"]
    negative_words = ["bad", "sad", "terrible", "poor"]

    text = text.lower()
    score = 0

    for word in positive_words:
        if word in text:
            score += 1

    for word in negative_words:
        if word in text:
            score -= 1

    # Ethical Notes:
    # - Dataset should be balanced and diverse
    # - Remove offensive or culturally biased terms
    # - Avoid making decisions using limited keywords

    if score > 0:
```

```
    return "Positive"
  elif score < 0:
    return "Negative"
  else:
    return "Neutral"

sample_text = input("Enter a sentence for sentiment analysis: ")
print("Sentiment:", analyze_sentiment(sample_text))



# ------------------------------------------------
# TASK 3: PRODUCT RECOMMENDATION WITH FAIRNESS
# ------------------------------------------------
"""
Write a Python program that recommends products based on user
history and follows ethical guidelines like transparency and fairness.
"""
print("\n--- Task 3: Ethical Product Recommendation ---")

def recommend_products(user_categories, products):
  recommendations = []

  for product in products:
    if product["category"] in user_categories:
      recommendations.append(product)
```

```
    # Ethical Guidelines:
    # - Avoid favoritism toward sponsored products
    # - Give equal visibility to all sellers
    # - Clearly explain recommendation logic to users

    return recommendations

user_history = ["electronics", "books"]

product_list = [
    {"name": "Laptop", "category": "electronics"},
    {"name": "Story Book", "category": "books"},
    {"name": "Shoes", "category": "fashion"},
]

recommended = recommend_products(user_history, product_list)

print("Recommendations based on your interests:")
for item in recommended:
    print("-", item["name"])

print("Reason: Products were recommended based on your browsing categories.")



# ------------------------------------------------
# TASK 4: ETHICAL LOGGING (NO SENSITIVE DATA)
```

```
# ------------------------------------------------
"""
Generate logging functionality for a Python web application and
ensure logs do not record sensitive information.
"""
print("\n--- Task 4: Ethical Logging ---")

import logging

logging.basicConfig(filename="app.log", level=logging.INFO)

def login_user(username, password):
  # Never log passwords, emails, or tokens

  logging.info(f"Login attempt by user: {username}")

  if password == "admin123":
    logging.info("Login successful")
    print("Login Successful")
    return True
  else:
    logging.warning("Login failed")
    print("Login Failed")
    return False

login_user("test_user", "1234")
```

```
# Ethical Logging Rules:
# - Do not log personal identifiers
# - Logs must help debugging, not invade privacy



# ------------------------------------------------
# TASK 5: ML MODEL WITH RESPONSIBLE USAGE NOTES
# ------------------------------------------------
"""
Generate a machine learning model and add documentation on
responsible usage, explainability, and limitations.
"""
print("\n--- Task 5: Responsible Machine Learning Model ---")

from sklearn.linear_model import LinearRegression
import numpy as np

# Sample training data (very small dataset)
X = np.array([[1], [2], [3], [4]])
y = np.array([100, 200, 300, 400])

model = LinearRegression()
model.fit(X, y)

prediction = model.predict([[5]])
```

```
print("Predicted Output:", prediction)


"""
Responsible AI Usage Notes:
- This model is trained on limited sample data
- Predictions may not generalize to real-world cases
- Do NOT use for medical, legal, or financial decisions
- Always evaluate accuracy and bias before deployment
- Provide explainable results to end users
"""


print("\n--- End of Lab 5 Ethical AI Demonstration ---")
```