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Subject	**Human Computer Interaction**

Lab#04

Lab-4: Cognitive Processes in Human-Computer Interaction (HCI)

Activity 1: Attention and Distraction in User Interfaces

Objective:

Show how random pop-ups affect reading attention.

Tools:

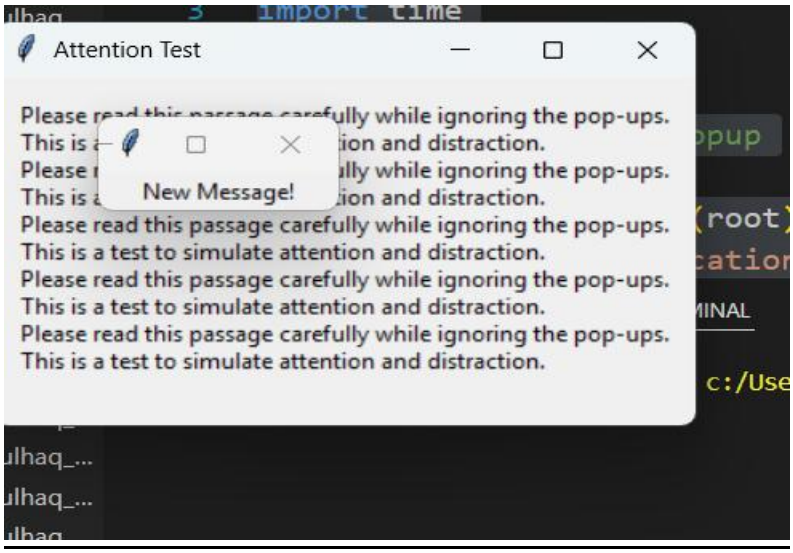
- Python (tkinter, threading, time, random)

Code:

```
import tkinter as tk
import threading
import time
import random


# Function to display popup
def show_popup():
    popup = tk.Toplevel(root)
```

```
    popup.title("Notification")
    tk.Label(popup, text="New Message!").pack()
    popup.after(2000, popup.destroy)  # auto close
# Background thread for random popups
def random_popups():
    while True:
        time.sleep(random.randint(3, 8))
        root.after(0, show_popup)
# Main Window
root = tk.Tk()
root.title("Attention Test")
tk.Label(root, text="Please read this passage carefully while ignoring the pop-ups.\n"
                    "This is a test to simulate attention and distraction.\n" * 5,
         wraplength=400, justify='left').pack(padx=10, pady=10)
# Start popup thread
threading.Thread(target=random_popups, daemon=True).start()


root.mainloop()
```

Output:



Expected Outcome:

- Students understand how random pop-ups cause distractions.

Activity 2: Perception and Recognition in UI Design

Objective:

Understand how color and icon design affect recognition.

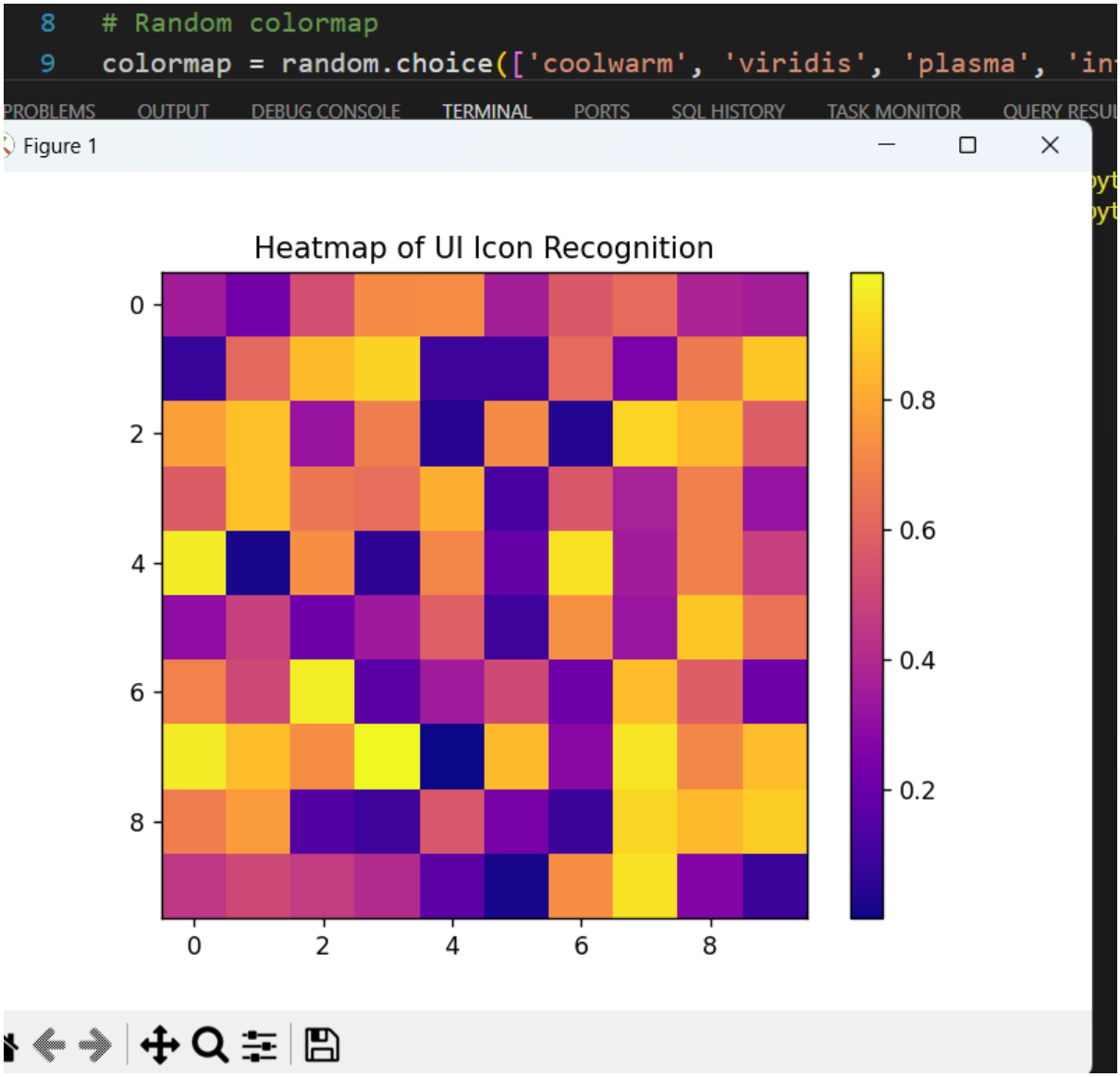
Tools:

- Python (matplotlib, numpy, random)

Code Implementation:

```
import matplotlib.pyplot as plt
import numpy as np
import random

# Simulated recognition pattern data
data = np.random.rand(10, 10)

# Random colormap
colormap = random.choice(['coolwarm', 'viridis', 'plasma', 'inferno'])

plt.imshow(data, cmap=colormap)
plt.colorbar()
plt.title("Heatmap of UI Icon Recognition")
plt.show()
```

Output:



Expected Outcome:

- Understand how proper color schemes and icon design improve recognition speed.

Activity 3: Memory and Automation in User Interfaces

Objective:

Compare manual vs. automated form filling.

Tools:

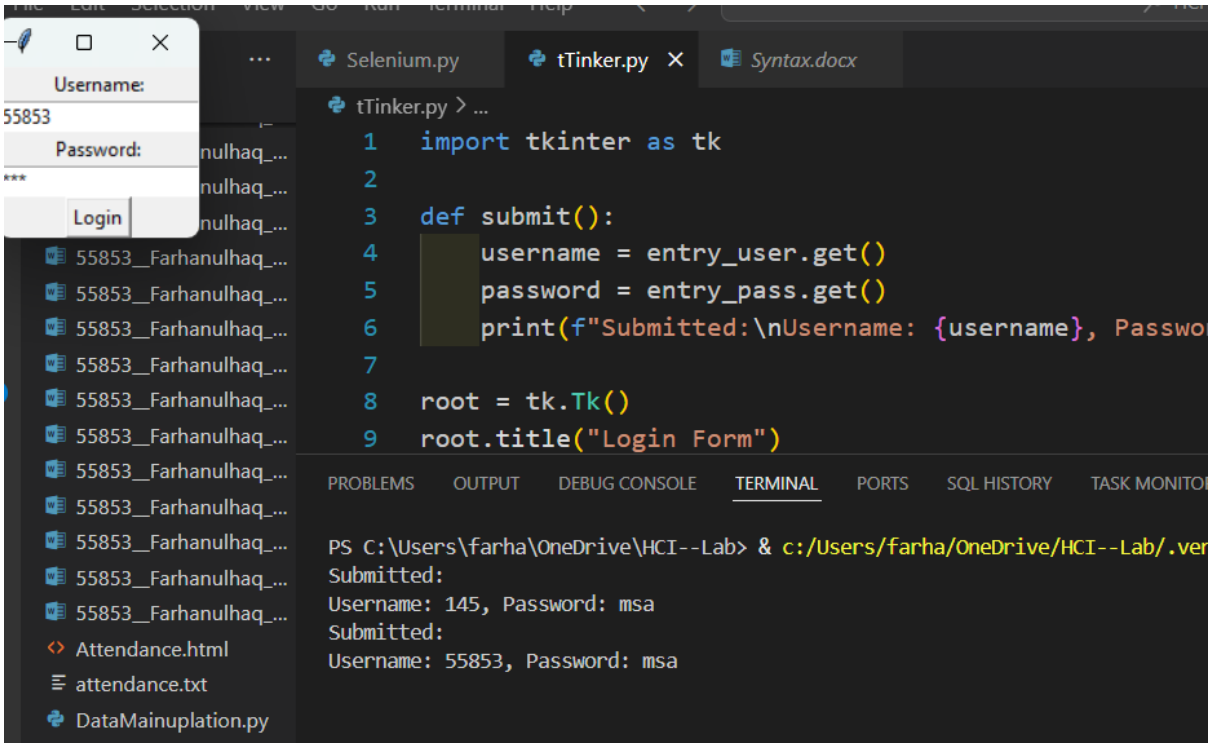
- Python (selenium, time)
- Tkinter (for manual form filling simulation)

Part A – Manual Tkinter UI import time:

```
import tkinter as tk


def submit():
    username = entry_user.get()
    password = entry_pass.get()
    print(f"Submitted:\nUsername: {username}, Password: {password}")


root = tk.Tk()
root.title("Login Form")


tk.Label(root, text="Username:").pack()
entry_user = tk.Entry(root)
entry_user.pack()


tk.Label(root, text="Password:").pack()
entry_pass = tk.Entry(root, show='*')
entry_pass.pack()


tk.Button(root, text="Login", command=submit).pack()
```

root.mainloop()

Output:



Part B – Automated Form Filling using Selenium:

from selenium import webdriver

from selenium.webdriver.common.keys import Keys

import time

Initialize the Chrome WebDriver

driver = webdriver.Chrome()

Open a login page (example site)

driver.get("https://example.com/login")

time.sleep(2) # Wait for page to load

Locate username and password fields

```
username = driver.find_element("name", "username")
password = driver.find_element("name", "password")

# Enter login credentials
username.send_keys("testuser")
password.send_keys("testpassword")
password.send_keys(Keys.RETURN)  # Submit the form

time.sleep(2)  # Wait after submission

driver.quit()  # Close the browser
```

```
log_data = []  # List to store task completion times

for i in range(5):
    start_time = time.time()
    input(f"Task {i+1}: Perform the action and press Enter...")
    end_time = time.time()
    log_data.append({'Task': i+1, 'Time Taken (s)': end_time - start_time})

# Create DataFrame and display results
df = pd.DataFrame(log_data)
print(df)
```

Expected Outcome:

- Students realize how auto-filling forms reduces cognitive load and saves time.
- Students suggest UI features like remember me checkboxes, form autofill, and credential managers.

Activity 4: Learning and Skill Acquisition in Software Use

Objective:

Track how users improve over tasks using time logs.

Tools:

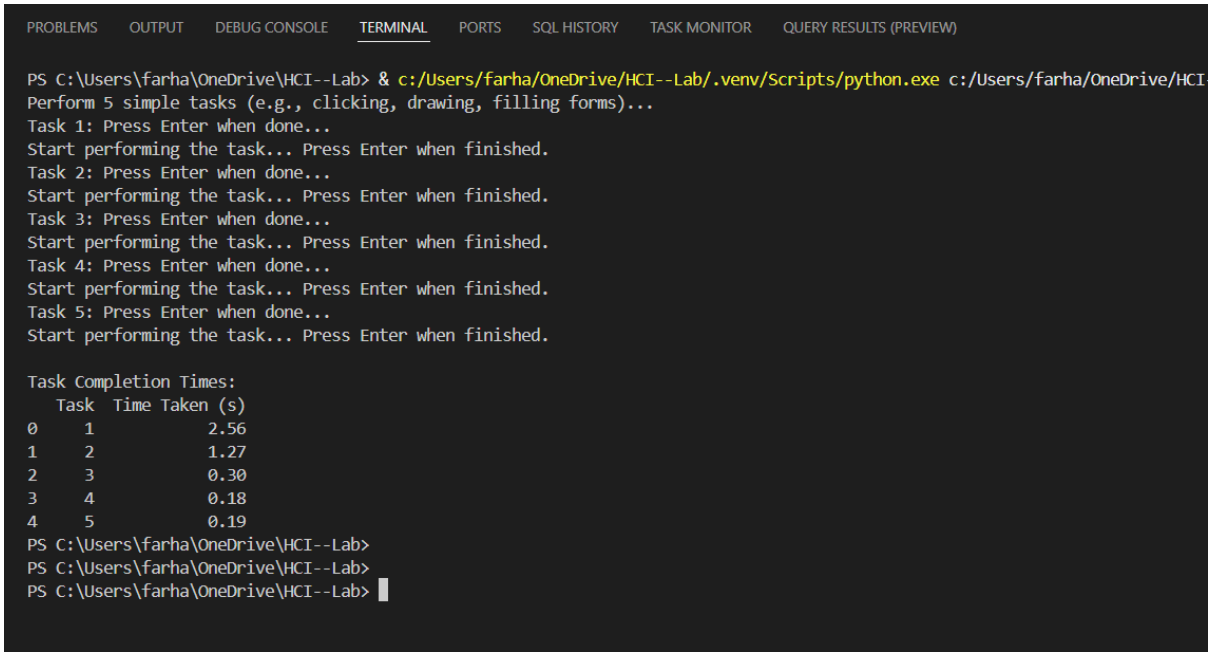
- Python (pandas, time)

Code Implementation:

```
import pandas as pd
import time

log_data = []

print("Perform 5 simple tasks (e.g., clicking, drawing, filling forms)...")

for i in range(5):
    input(f"Task {i+1}: Press Enter when done...")
    start = time.time()
    input("Start performing the task... Press Enter when finished.")
    end = time.time()
    log_data.append({'Task': i+1, 'Time Taken (s)': round(end - start, 2)})

df = pd.DataFrame(log_data)
```

```
print("\nTask Completion Times:")
print(df)
```

Output:



Summary Table of Lab 4

Activity	Focus	Tools Used	Output
Activity 1	Attention & Distraction	Tkinter, Threading	UI distraction simulation
Activity 2	Perception & Recognition	Matplotlib	Heatmaps and UI redesign
Activity 3	Memory & Automation	Selenium	Automated form filling
Activity 4	Learning & Skill Acquisition	Pandas	Learning curve data

📚 Helping Material / References

- "Human-Computer Interaction" by Alan Dix et al.

- "Computer Graphics: Principles and Practice" by John F. Hughes et al.
- Figma / Adobe XD tutorials online.

THE END