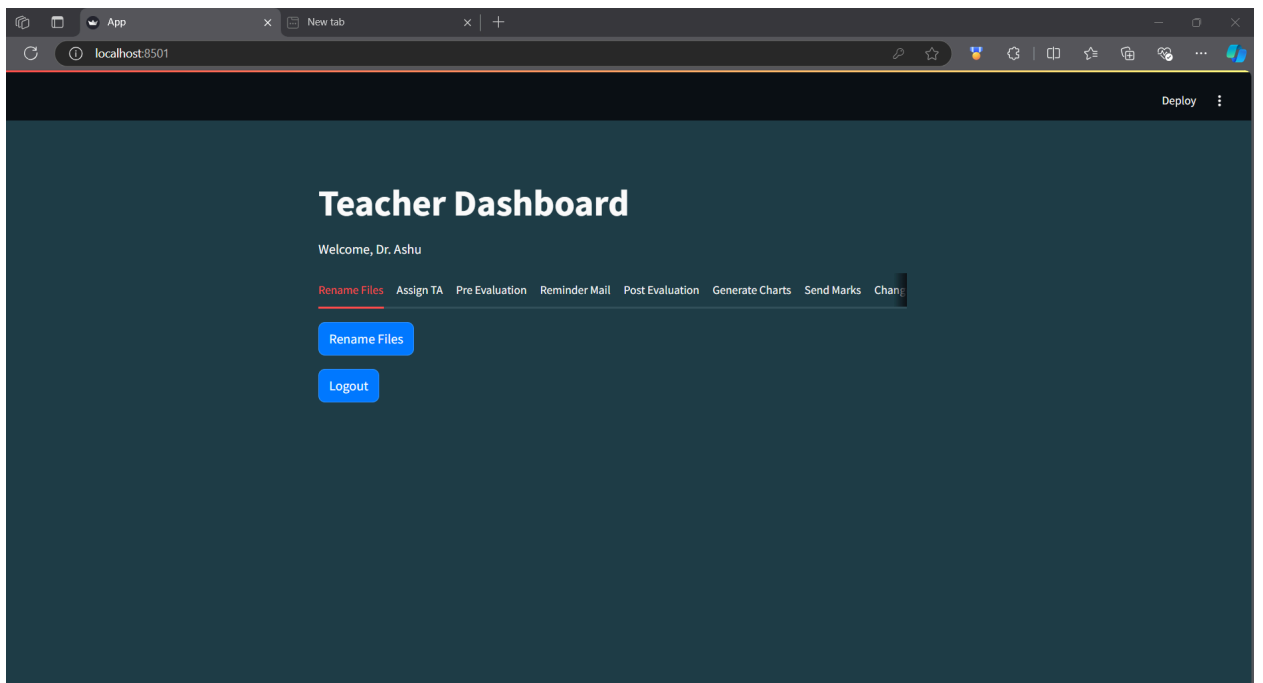
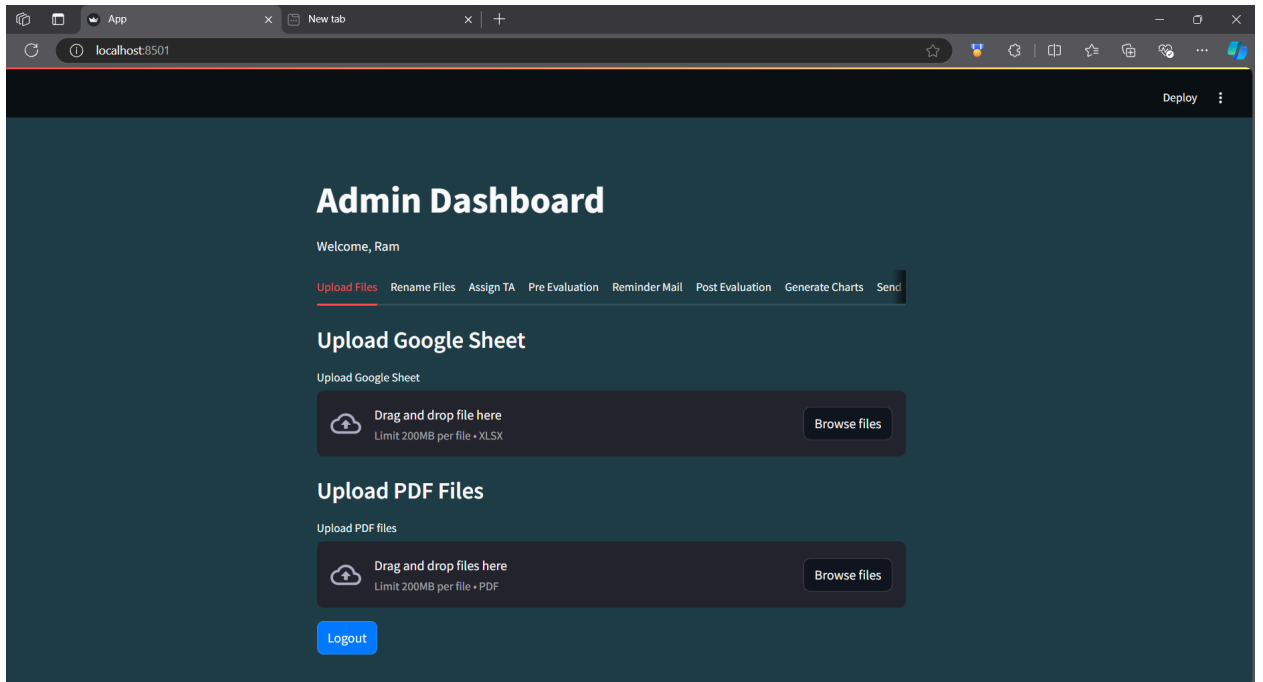
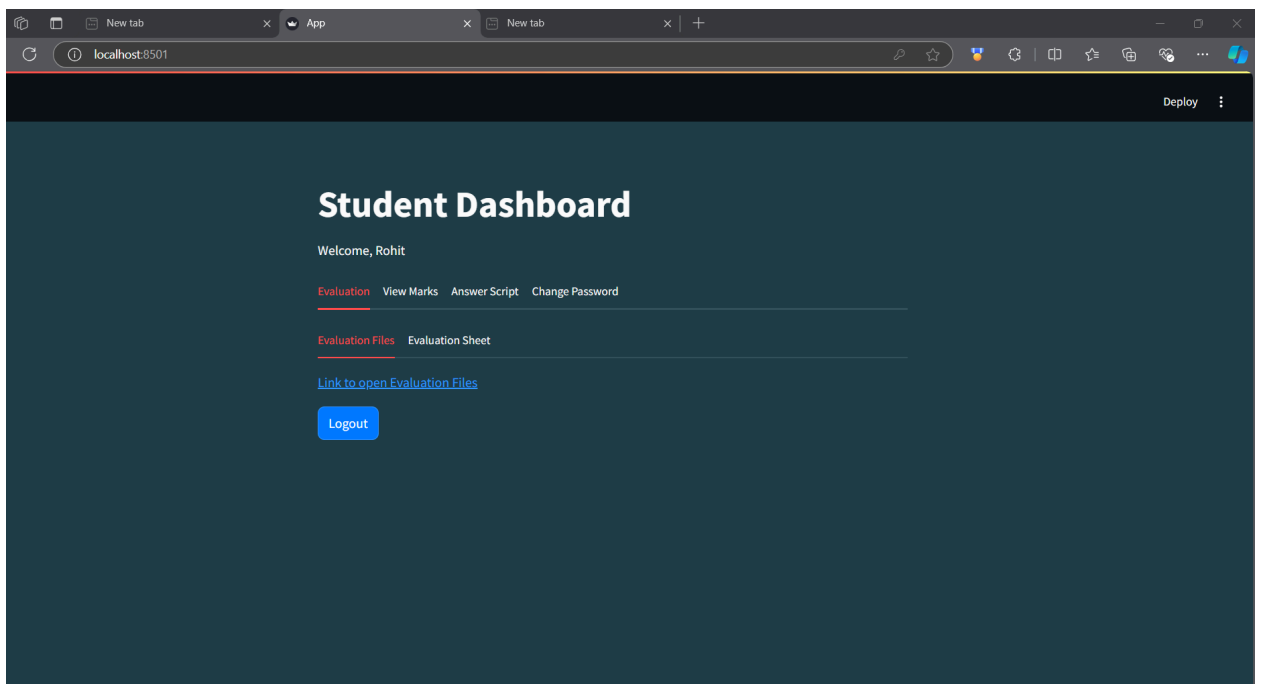
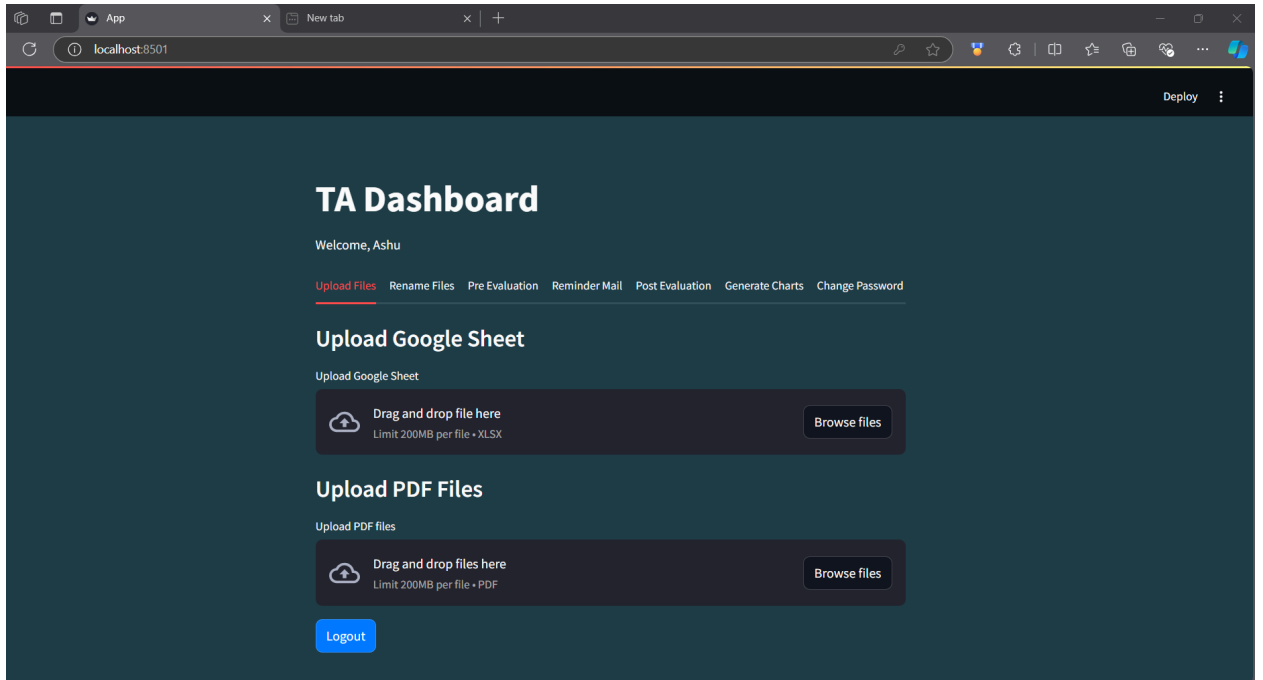


Peer Evaluation System UI/UX

Screenshots of the UI/UX design: -

- The changes from the today's code are reflected below: -





Python Code: -

1. App.py -

```
import io
import re
import time
import bcrypt
import gspread
import requests
import streamlit as st
from Rename_File import process_signatures, load_stored_signatures
from googleapiclient.discovery import build
from googleapiclient.http import MediaIoBaseUpload
from googleapiclient.http import MediaIoBaseDownload
from oauth2client.service_account import ServiceAccountCredentials

# Google Sheets and Google Drive setup
SCOPE = [
    "https://spreadsheets.google.com/feeds",
    "https://www.googleapis.com/auth/drive"
]
CREDENTIALS_FILE = "peer-evaluation-sem1-e2fcf8b5fc27.json"
SHEET_NAME = "UserRoles"

# Initialize connection to Google Sheets
def connect_to_google_sheets():
    creds =
    ServiceAccountCredentials.from_json_keyfile_name(CREDENTIALS_FILE,
    SCOPE)
    client = gspread.authorize(creds)
    sheet = client.open(SHEET_NAME).sheet1
    return sheet

# Google Drive authentication
def authenticate_drive():
```

```

    creds =
ServiceAccountCredentials.from_json_keyfile_name(CREDENTIALS_FILE,
SCOPE)
    service = build('drive', 'v3', credentials=creds)
    return service

# Fetch users from Google Sheets
def get_users_from_sheets():
    sheet = connect_to_google_sheets()
    records = sheet.get_all_records()
    return records

def validate_password(password):
    pattern =
re.compile(r'^(?=[A-Z])(?=[a-z])(?=\d)(?=[@$_!%*?&])[A-Za-z\d@$_!%*?
&]{8,}$')
    return pattern.match(password)

# Add new user to Google Sheets with role auto-assignment
def register_user(username, password):
    sheet = connect_to_google_sheets()

    # Check if the email contains numeric values (assumed to be student)
    if re.search(r'\d', username):
        role = "Student"
    else:
        role = "Teacher"

    # Hash the password before saving
    hashed_password = bcrypt.hashpw(password.encode('utf-8'), bcrypt.gensalt())

    new_user = [username, hashed_password.decode('utf-8'), role]

    #new_user = [username, password, role]
    sheet.append_row(new_user)
    return role

# Update role from Student to TA (only for Teachers)

```

```

def update_role_to_ta(username):
    sheet = connect_to_google_sheets()
    records = sheet.get_all_records()
    for i, user in enumerate(records, start=2): # start=2 to account for 1-based index
        in Google Sheets
        if user['username'] == username and user['role'] == 'Student':
            sheet.update_cell(i, 3, 'TA') # Assuming role is in column 3
            return True
    return False

```

```

# Verify user credentials
def login(username, password, users):
    for user in users:
        if user['username'] == username:
            # Check if the password matches the stored hash
            if bcrypt.checkpw(password.encode('utf-8'),
user['password'].encode('utf-8')):
                st.session_state["login_status"] = True
                st.session_state["role"] = user["role"]
                st.session_state["username"] = username
                st.session_state["page"] = "dashboard"
                st.session_state["message"] = None
                return
            else:
                st.error("Incorrect Password!")
                time.sleep(2)
                st.rerun()
                return
    st.error("Incorrect Username or Password!")
    time.sleep(2)
    st.rerun()

```

```

# Logout function
def logout():
    st.session_state["login_status"] = False
    st.session_state["role"] = None
    st.session_state["username"] = None

```

```

st.session_state["page"] = "login"
st.success("Logging out!")
time.sleep(0.5)
#st.session_state["message"] = "Logged out successfully"

# Function to change password
def change_password(username, current_password, new_password):
    sheet = connect_to_google_sheets()
    records = sheet.get_all_records()

    # Find the user in the records
    for i, user in enumerate(records, start=2): # start=2 for 1-based indexing
        (Google Sheets)
        if user['username'] == username:
            # Check if the current password matches the stored hash
            if bcrypt.checkpw(current_password.encode('utf-8'),
                user['password'].encode('utf-8')):
                # Hash the new password
                hashed_new_password = bcrypt.hashpw(new_password.encode('utf-8'),
                    bcrypt.gensalt()).decode('utf-8')

                # Update the password in the sheet
                sheet.update_cell(i, 2, hashed_new_password)
                return True # Password changed successfully
            else:
                return False # Current password is incorrect
        return False # User not found

def change_password_dashboard():
    st.header("Change Password")

    current_password = st.text_input("Current Password", type="password")
    new_password = st.text_input("New Password", type="password")
    confirm_password = st.text_input("Confirm New Password", type="password")

    if st.button("Change Password"):
        if new_password != confirm_password:
            st.error("New password and confirm password do not match!")
        elif not validate_password(new_password):

```

```

        st.error(
            "Password must include at least: - \n1. One uppercase letter. \n2. One
            lowercase letter. \n3. One special character. \n4. One numerical digit. \n5. Must be
            at least 8 characters long.")
        else:
            success = change_password(st.session_state['username'],
            current_password, new_password)
            if success:
                st.success("Password changed successfully!")
                time.sleep(2)
                logout()
                st.rerun()
            else:
                st.error("Failed to change password. Incorrect current password.")

```

```

def trigger_google_apps_script(function_name):
    #web_app_url =
    "https://script.google.com/macros/s/AKfycbwIbil062YhNYcbIqmP9obfLBKgoel
    dTdRDQ_BOB4rF1S6JhTxvVFH8MhW2x84bgyAVag/exec" # Replace with
    your web app URL
    web_app_url =
    "https://script.google.com/macros/s/AKfycbwyD-ImNeqaa7NzPCU5AZ6978PSR
    vQuuyEreskmCnrzoM0P30EGHuR-sloqklHBHINlxQ/exec"
    url = f"{web_app_url}?action={function_name}" # Append the function name
    as the 'action' parameter
    try:
        response = requests.get(url)
        if response.status_code == 200:
            st.success(f"{function_name} executed successfully!")
        else:
            st.error(f"Failed to execute {function_name}. Status code:
            {response.status_code}")
    except Exception as e:
        st.error(f"An error occurred: {str(e)}")

```

```

# Function to check if a file already exists in Google Drive folder
def file_exists(drive_service, folder_id, file_name):
    query = f"'{folder_id}' in parents and name='{file_name}'"

```

```

    results = drive_service.files().list(q=query, spaces='drive', fields='files(id,
name)').execute()
    files = results.get('files', [])
    return any(file['name'] == file_name for file in files)

```

Function to upload PDF files to Google Drive

```

def upload_pdfs(uploaded_files, folder_id):
    drive_service = authenticate_drive()
    count = 0

    for uploaded_file in uploaded_files:
        if file_exists(drive_service, folder_id, uploaded_file.name):
            #st.warning(f"PDF file '{uploaded_file.name}' already exists in the
            folder.")
            continue

        file_metadata = {
            'name': uploaded_file.name,
            'parents': [folder_id]
        }
        media = MediaIoBaseUpload(uploaded_file, mimetype='application/pdf')
        drive_service.files().create(body=file_metadata, media_body=media,
        fields='id').execute()
        count = count + 1
        #st.session_state["success_message"] = f"Uploaded PDF file
        '{uploaded_file.name}' to Google Drive"

    st.success(f" The {count} files are uploaded to the Google Drive.")

```

Function to upload Google Sheets files to Google Drive

```

def upload_sheets(uploaded_files, folder_id):
    drive_service = authenticate_drive()

    for uploaded_file in uploaded_files:
        if file_exists(drive_service, folder_id, uploaded_file.name):
            #st.warning(f"Google Sheet file '{uploaded_file.name}' already exists in
            the folder.")
            continue

```



```

        file_metadata = {
            'name': uploaded_file.name,
            'parents': [folder_id],
            'mimeType': 'application/vnd.google-apps.spreadsheet'
        }
        media = MediaIoBaseUpload(uploaded_file,
mimetype='application/vnd.ms-excel')
        drive_service.files().create(body=file_metadata, media_body=media,
fields='id').execute()

```

```

st.success("The Excel sheet has been uploaded to the Google Drive.")

```

```

# Helper function to connect to a specific Google Sheet
def connect_to_google_sheets_with_name(sheet_name):
    creds =
ServiceAccountCredentials.from_json_keyfile_name(CREDENTIALS_FILE,
SCOPE)
    client = gspread.authorize(creds)
    sheet = client.open(sheet_name)
    return sheet

def get_student_details(username):
    # Connect to the specific Google Sheet containing marks
    sheet_name = "UI/UX Copy of Peer Evaluation2"
    sheet = connect_to_google_sheets_with_name(sheet_name) # Modify to accept
a sheet name
    peer_eval_sheet = sheet.worksheet('PeerEval') # Open the "PeerEval" sheet

    # Fetch all the data from the "PeerEval" sheet
    records = peer_eval_sheet.get_all_records()

    # Find marks for the current user
    for record in records:
        if record['EMail ID'] == username: # Ensure this matches your column name
            return record['Average Marks'], record['Unique ID'], record['Assigned
Folder Link'], record['Spreadsheet Link'] # Returning the Average Mark's and
Unique id

```

```
return None, None, None, None # If no details found for the user
```

```
# Fetch the student's PDF from Google Drive using unique ID
```

```
def get_student_pdf(unique_id):
```

```
    drive_service = authenticate_drive()
```

```
    folder_id = "1fT-inciLQut85BGEQrjMSWbVRcTsdWfQ"
```

```
    query = f"'{folder_id}' in parents and name contains '{unique_id}'"
```

```
    results = drive_service.files().list(q=query, fields="files(id, name)").execute()
```

```
    files = results.get('files', [])
```

```
    if files:
```

```
        file_id = files[0]['id']
```

```
        file_name = files[0]['name']
```

```
        # Download the PDF
```

```
        request = drive_service.files().get_media(fileId=file_id)
```

```
        fh = io.BytesIO()
```

```
        downloader = MediaIoBaseDownload(fh, request)
```

```
        done = False
```

```
        while not done:
```

```
            status, done = downloader.next_chunk()
```

```
        fh.seek(0)
```

```
        return fh, file_name
```

```
    return None, None
```

```
def renaming_files():
```

```
    # Authenticate Google Drive
```

```
    service = authenticate_drive()
```

```
    # Google Drive folder IDs
```

```
    stored_signatures_folder_id = '14QLNPdIRUZ3ici-GePoEewUCmxemjhUD'
```

```
#The folder where we want to keep the Stored signature
```

```
    uploaded_signatures_folder_id = '1ORVrU-UoXyDS-1ovyuk7FAjb_p94gnsx'
```

```
#This will be the folder where our pdf files are kept
```

```
    destination_folder_id = '1bPhLMZONpsPDxM9z_vQD2J9jAjtWg3FG' #
```

```
Folder where renamed files will be moved
```

```

# Load stored signatures directly from Google Drive
stored_signatures, stored_filenames = load_stored_signatures(service,
stored_signatures_folder_id)

# Process uploaded signatures and copy renamed files to the destination folder
matched_files = process_signatures(service, uploaded_signatures_folder_id,
stored_signatures, stored_filenames, destination_folder_id)

print(f"Matching process completed. Total matched files:
{len(matched_files)}")

def admin_dashboard():
    st.title("Admin Dashboard")
    st.write(f"Welcome, {st.session_state['username'].split('.')[0].capitalize()}")

# Create tabs for each action
tab, tab7, tab0, tab1, tab2, tab3, tab4, tab5, tab6 = st.tabs(
    ["Upload Files", "Rename Files", "Assign TA", "Pre Evaluation", "Reminder
Mail", "Post Evaluation", "Generate Charts",
    "Send Marks", "Change Password"])

# Tab for File upload option
with tab:
    # Folder ID for the Google Drive folder where the files will be saved
    folder_id = "1fT-incILQut85BGEQrjMSWbVRcTsdWfQ" # Replace this
with your folder ID

    # Allow file upload for multiple Google Sheets
    st.subheader("Upload Google Sheet")
    sheet_files = st.file_uploader("Upload Google Sheet", type=["xlsx"],
accept_multiple_files=False,
                                key="sheet_uploader")

    if sheet_files:
        upload_sheets(sheet_files, folder_id)

# Allow file upload for multiple PDFs

```

```

st.subheader("Upload PDF Files")
pdf_files = st.file_uploader("Upload PDF files", type=["pdf"],
accept_multiple_files=True, key="pdf_uploader")

if pdf_files:
    upload_pdfs(pdf_files, folder_id)

with tab7:
    if st.button("Rename Files"):
        renaming_files()

# Tab for TA update
with tab0:
    student_username = st.text_input("Enter Student's Username")
    if st.button("Update Role to TA"):
        if update_role_to_ta(student_username):
            st.success(f'{student_username.split('.')[0].capitalize()}'s role updated to
TA.")
        else:
            st.error("Failed to update the role. Check if the username exists and
belongs to a student.")

# Tab for Pre Evaluation
with tab1:
    if st.button("Pre Evaluation"):
        trigger_google_apps_script("PreEval")

# Tab for Checking Pending Evaluations
with tab2:
    if st.button("Reminder Mail"):
        trigger_google_apps_script("CheckEval")

# Tab for Post Evaluation
with tab3:
    if st.button("Post Evaluation"):
        trigger_google_apps_script("PostEval")

# Tab for Generating Charts
with tab4:
    if st.button("Generate Charts"):

```

```

        trigger_google_apps_script("GenChart")

# Tab for Sending Marks
with tab5:
    if st.button("Send Marks"):
        trigger_google_apps_script("SendMail")

with tab6:
    change_password_dashboard()

def teacher_dashboard():
    st.title("Teacher Dashboard")
    #st.write(f"Welcome, {st.session_state['username']}")
    var_user = st.session_state['username'].split('@')[0]
    if '.' in var_user:
        st.write(f"Welcome, Dr. {var_user.split('.')[0].capitalize()}")
    else:
        st.write(f"Welcome, Dr. {var_user.capitalize()}")

# Create tabs for each action
tab, tab0, tab1, tab2, tab3, tab4, tab5, tab6 = st.tabs(["Rename Files", "Assign
TA", "Pre Evaluation", "Reminder Mail", "Post Evaluation", "Generate Charts",
"Send Marks", "Change Password"])

# Tab for TA update
with tab:
    if st.button("Rename Files"):
        renaming_files()
with tab0:
    student_username = st.text_input("Enter Student's Username")
    if st.button("Update Role to TA"):
        if update_role_to_ta(student_username):
            st.success(f"{student_username.split('.')[0].capitalize()}'s role updated to
TA.")
        else:
            st.error("Failed to update the role. Check if the username exists and
belongs to a student.")

```

```

# Tab for Pre Evaluation
with tab1:
    if st.button("Pre Evaluation"):
        trigger_google_apps_script("PreEval")

# Tab for Checking Pending Evaluations
with tab2:
    if st.button("Reminder Mail"):
        trigger_google_apps_script("CheckEval")

# Tab for Post Evaluation
with tab3:
    if st.button("Post Evaluation"):
        trigger_google_apps_script("PostEval")

# Tab for Generating Charts
with tab4:
    if st.button("Generate Charts"):
        trigger_google_apps_script("GenChart")

# Tab for Sending Marks
with tab5:
    if st.button("Send Marks"):
        trigger_google_apps_script("SendMail")

with tab6:
    change_password_dashboard()

```

```

# Role-based content: Teacher Dashboard with multiple file uploads
def ta_dashboard():
    st.title("TA Dashboard")
    st.write(f'Welcome, {st.session_state['username'].split('.')[0].capitalize()}')
    #st.write(f'Welcome, {st.session_state['username']}')

# Create tabs for each action
tab, tab5, tab0, tab1, tab2, tab3, tab4 = st.tabs(

```

```
["Upload Files", "Rename Files", "Pre Evaluation", "Reminder Mail", "Post Evaluation", "Generate Charts", "Change Password"]])
```

```
# Tab for File upload option
```

```
with tab:
```

```
    # Folder ID for the Google Drive folder where the files will be saved
```

```
    folder_id = "1fT-incilQut85BGEQrjMSWbVRcTsdWfQ" # Replace this  
with your folder ID
```

```
    # Allow file upload for multiple Google Sheets
```

```
    st.subheader("Upload Google Sheet")
```

```
    sheet_files = st.file_uploader("Upload Google Sheet", type=["xlsx"],  
accept_multiple_files=False,  
                                key="sheet_uploader")
```

```
    if sheet_files:
```

```
        upload_sheets(sheet_files, folder_id)
```

```
    # Allow file upload for multiple PDFs
```

```
    st.subheader("Upload PDF Files")
```

```
    pdf_files = st.file_uploader("Upload PDF files", type=["pdf"],  
accept_multiple_files=True, key="pdf_uploader")
```

```
    if pdf_files:
```

```
        upload_pdfs(pdf_files, folder_id)
```

```
with tab5:
```

```
    if st.button("Rename Files"):
```

```
        renaming_files()
```

```
# Tab for Pre Evaluation
```

```
with tab0:
```

```
    if st.button("Pre Evaluation"):
```

```
        trigger_google_apps_script("PreEval")
```

```
# Tab for Checking Pending Evaluations
```

```
with tab1:
```

```
    if st.button("Reminder Mail"):
```

```
        trigger_google_apps_script("CheckEval")
```

```

# Tab for Post Evaluation
with tab2:
    if st.button("Post Evaluation"):
        trigger_google_apps_script("PostEval")

# Tab for Generating Charts
with tab3:
    if st.button("Generate Charts"):
        trigger_google_apps_script("GenChart")

with tab4:
    change_password_dashboard()

def student_dashboard():
    st.title("Student Dashboard")
    st.write(f"Welcome, {st.session_state['username'].split('.')[0].capitalize()}")
    #st.write(f"Welcome, {st.session_state['username']}")

# Creating tabs
tab1, tab2, tab3, tab4 = st.tabs(["Evaluation", "View Marks", "Answer Script",
"Change Password"])

# with tab0:
#     change_password_dashboard()
#     if st.session_state["username"]:
#         # Fetch marks, unique ID, and spreadsheet link using the session's
username
#         marks, unique_id, folder_link, sheet_link =
get_student_details(st.session_state["username"])
#     else:
#         st.error("Username is Incorrect!")

# Tab for opening the peer evaluation spreadsheet
with tab1:
    if st.session_state["username"]:

```



```

        # Fetch marks, unique ID, and spreadsheet link using the session's
        username
        marks, unique_id, folder_link, sheet_link =
        get_student_details(st.session_state["username"])
        else:
            st.error("Username is Incorrect!")

        t1, t2 = st.tabs(["Evaluation Files", "Evaluation Sheet"])
        with t1:
            if folder_link:
                st.markdown(f"[Link to open Evaluation Files]({folder_link})",
                unsafe_allow_html=True)
            else:
                st.error("Folder link not found,")
        with t2:
            if sheet_link:
                st.markdown(f"[Link to open Evaluation Sheet]({sheet_link})",
                unsafe_allow_html=True)
            else:
                st.error("Spreadsheet link not found.")

        # Tab for viewing marks
        with tab2:
            if st.button("See Marks"):
                if marks and unique_id:
                    st.write(f"Your evaluation marks are = {marks}")
                else:
                    st.error("No marks are available.")

        # Tab for downloading PDF
        with tab3:
            pdf_file, file_name = get_student_pdf(unique_id)
            if pdf_file:
                st.download_button(
                    label="Download your Evaluation PDF",
                    data=pdf_file,
                    file_name=file_name,
                    mime='application/pdf'
                )
            else:

```

```
st.error("PDF not found.")
```

```
with tab4:
```

```
    change_password_dashboard()
```

```
# Main Streamlit app
```

```
def main():
```

```
    # Initialize session state variables if not present
```

```
    if "login_status" not in st.session_state:
```

```
        st.session_state["login_status"] = False
```

```
    if "role" not in st.session_state:
```

```
        st.session_state["role"] = None
```

```
    if "username" not in st.session_state:
```

```
        st.session_state["username"] = None
```

```
    if "page" not in st.session_state:
```

```
        st.session_state["page"] = "login"
```

```
    if "message" not in st.session_state:
```

```
        st.session_state["message"] = None
```

```
    if "success_message" not in st.session_state:
```

```
        st.session_state["success_message"] = None
```

```
# Set background color and input field styling using HTML
```

```
st.markdown(
```

```
    """
```

```
    <style>
```

```
    .stApp {
```

```
        background-color: #1f3f49; /* Light blue background */
```

```
    }
```

```
    .stTextInput>div>input, .stPasswordInput>div>input {
```

```
        background-color: white; /* White background for text and password
```

```
inputs */
```

```
        color: black; /* Text color for input fields */
```

```
    }
```

```
    .stButton>button {
```

```
        background-color: #007bff; /* Optional: Style buttons with a color */
```

```
        color: white;
```

```

    }
    </style>
    """
    unsafe_allow_html=True
)

# Page routing based on session state
if st.session_state["page"] == "login":
    st.title("Peer Evaluation System")

# Tabs for Login and Registration
tab1, tab2 = st.tabs(["Login", "Register"])

with tab1:
    st.header("Login")

    with st.form(key='login_form'):
        username = st.text_input("Email ID")
        password = st.text_input("Password", type="password")
        submit_button = st.form_submit_button("Login")

    if submit_button:
        users = get_users_from_sheets()
        login(username, password, users)
        if st.session_state["login_status"]:
            st.rerun()

with tab2:
    st.header("Register")

    with st.form(key='register_form'):
        reg_username = st.text_input("Email ID", key='reg_username')
        reg_password = st.text_input("Password", type="password",
key='reg_password')
        register_button = st.form_submit_button("Register")

    if register_button:
        if not reg_username.endswith("@iitrpr.ac.in"):
            st.error("Email ID must end with @iitrpr.ac.in")
        elif not validate_password(reg_password):

```

```
st.error("Password must include at least One: - \n1. Uppercase
letter. \n2. Lowercase letter. \n3. Special character. \n4. Numerical digit. \n5. Must
be at least 8 characters long.")
```

```
else:
```

```
users = get_users_from_sheets()
```

```
if any(user['username'] == reg_username for user in users):
```

```
st.error("Username already exists")
```

```
else:
```

```
role = register_user(reg_username, reg_password)
```

```
st.success(f"User registered successfully with role: {role}")
```

```
time.sleep(2)
```

```
# Redirect to the login page
```

```
st.session_state["page"] = "login"
```

```
st.rerun()
```

```
elif st.session_state["page"] == "dashboard":
```

```
if st.session_state["role"] == "Admin":
```

```
admin_dashboard()
```

```
elif st.session_state["role"] == "Teacher":
```

```
teacher_dashboard()
```

```
elif st.session_state["role"] == "TA":
```

```
ta_dashboard()
```

```
elif st.session_state["role"] == "Student":
```

```
student_dashboard()
```

```
# Logout button
```

```
if st.button("Logout"):
```

```
logout()
```

```
st.rerun()
```

```
if __name__ == "__main__":
```

```
main()
```

2. Rename_File.py -

```
import os
import io
import cv2
import numpy as np
from googleapiclient.discovery import build
from google.oauth2.service_account import Credentials
from skimage.metrics import structural_similarity as ssim
from scipy.ndimage import center_of_mass
from googleapiclient.http import MediaIoBaseDownload

SCOPE = [
    "https://spreadsheets.google.com/feeds",
    "https://www.googleapis.com/auth/drive"
]
CREDENTIALS_FILE = "peer-evaluation-sem1-e2fcf8b5fc27.json"

# Authenticate Google Drive
def authenticate_drive():
    creds = Credentials.from_service_account_file(CREDENTIALS_FILE)
    service = build('drive', 'v3', credentials=creds)
    return service

# List files in a Google Drive folder
def list_files_in_folder(service, folder_id):
    results = service.files().list(
        q=f"{folder_id}" in parents and mimeType !=
        'application/vnd.google-apps.folder',
        pageSize=1000, fields="files(id, name)").execute()
    return results.get('files', [])

# Read file content from Google Drive (read as image data)
def read_drive_image_file(service, file_id):
    request = service.files().get_media(fileId=file_id)
    file_bytes = io.BytesIO()
    downloader = MediaIoBaseDownload(file_bytes, request)
    done = False
    while not done:
        _, done = downloader.next_chunk()
```

```

file_bytes.seek(0) # Reset pointer to start
file_array = np.frombuffer(file_bytes.read(), np.uint8)
image = cv2.imdecode(file_array, cv2.IMREAD_GRAYSCALE) # Decode as
grayscale image
return image

```

```

# Copy and rename a file in Google Drive to a new folder
def copy_and_rename_drive_file(service, file_id, new_name,
destination_folder_id):
    file_metadata = {
        'name': new_name,
        'parents': [destination_folder_id] # Move file to this folder
    }
    copied_file = service.files().copy(fileId=file_id, body=file_metadata).execute()
    return copied_file

```

```

# Delete a file in Google Drive
def delete_drive_file(service, file_id):
    service.files().delete(fileId=file_id).execute()

```

```

# Preprocess image (resize and normalize)
def preprocess_image(image):
    image = cv2.resize(image, (256, 256)) # Resize
    image = image / 255.0 # Normalize pixel values
    return image

```

```

# Align signatures by centering the image based on center of mass
def align_images(image):
    cy, cx = center_of_mass(image)
    height, width = image.shape
    shift_x = int(width / 2 - cx)
    shift_y = int(height / 2 - cy)
    translation_matrix = np.float32([[1, 0, shift_x], [0, 1, shift_y]])
    aligned_image = cv2.warpAffine(image, translation_matrix, (width, height))
    return aligned_image

```

```

# Compare signatures using SSIM
def compare_signatures(stored_sig, uploaded_sig):
    aligned_stored_sig = align_images(stored_sig)
    aligned_uploaded_sig = align_images(uploaded_sig)

```

```

    score, _ = ssim(aligned_stored_sig, aligned_uploaded_sig, full=True,
data_range=1.0)
    return score

# Load stored signatures directly from Google Drive (in memory)
def load_stored_signatures(service, stored_signatures_folder_id):
    stored_signatures = []
    stored_filenames = []
    files = list_files_in_folder(service, stored_signatures_folder_id)

    for file in files:
        image = read_drive_image_file(service, file['id'])
        image = preprocess_image(image)
        stored_signatures.append(image)
        stored_filenames.append(file['name'])
        print(f'Loaded stored signature: {file['name']}') # Debugging info
    return stored_signatures, stored_filenames

# Compare uploaded signature with stored signatures and copy file to a new
folder if matched
def process_signatures(service, uploaded_signatures_folder_id, stored_signatures,
stored_filenames, destination_folder_id, threshold=0.85):
    uploaded_files = list_files_in_folder(service, uploaded_signatures_folder_id)
    matched_files = []

    for uploaded_file in uploaded_files:
        uploaded_image = read_drive_image_file(service, uploaded_file['id'])
        uploaded_image = preprocess_image(uploaded_image)

        # Compare each uploaded signature with stored signatures
        matched_filename = None
        print(f'Comparing uploaded file: {uploaded_file['name']}') # Debugging
info
        for stored_signature, stored_filename in zip(stored_signatures,
stored_filenames):
            similarity_score = compare_signatures(stored_signature, uploaded_image)
            print(f'Comparing with stored file: {stored_filename}, Similarity:
{similarity_score}') # Debugging info
            if similarity_score > threshold: # Match threshold
                matched_filename = stored_filename

```

```

        print(f'Match found: {uploaded_file['name']} -> {stored_filename}') #
Debugging info
        break

    # If a match is found, copy and rename the file in the new folder
    if matched_filename:
        copied_file = copy_and_rename_drive_file(service, uploaded_file['id'],
matched_filename, destination_folder_id)
        # Delete original file after copying
        #delete_drive_file(service, uploaded_file['id'])
        print(f'Copied and renamed {uploaded_file['name']} to
{matched_filename} in destination folder")
        matched_files.append((uploaded_file['name'], matched_filename))
    else:
        print(f'No match found for {uploaded_file['name']}") # Debugging info

return matched_files

```

3. Handwriting recognition model: -

```

import tensorflow as tf
from tensorflow.keras import layers, models
import numpy as np
import matplotlib.pyplot as plt

# Generate synthetic data (replace with your dataset)
def generate_data(num_samples, img_height, img_width, num_classes):
    x_data = np.random.rand(num_samples, img_height, img_width, 1)
    y_data = np.random.randint(0, num_classes, size=(num_samples,))
    y_data = tf.keras.utils.to_categorical(y_data, num_classes)
    return x_data, y_data

# Create CRNN model
def create_crnn_model(input_shape, num_classes):
    model = models.Sequential()
    model.add(layers.Conv2D(32, (3, 3), activation='relu', padding='same',
input_shape=input_shape))
    model.add(layers.MaxPooling2D((2, 2)))
    model.add(layers.Conv2D(64, (3, 3), activation='relu', padding='same'))

```



```

model.add(layers.MaxPooling2D((2, 2)))
model.add(layers.Conv2D(128, (3, 3), activation='relu', padding='same'))
model.add(layers.MaxPooling2D((2, 2)))
model.add(layers.Reshape((-1, model.output_shape[1] *
model.output_shape[2])))
model.add(layers.Bidirectional(layers.LSTM(128, return_sequences=True)))
model.add(layers.Bidirectional(layers.LSTM(64)))
model.add(layers.Dense(num_classes, activation='softmax'))
model.compile(optimizer='adam', loss='categorical_crossentropy',
metrics=['accuracy'])
return model

```

```

# Generate synthetic dataset
img_height, img_width = 32, 128 # Typical dimensions for handwriting images
num_classes = 26 # For example, A-Z
x_train, y_train = generate_data(1000, img_height, img_width, num_classes)
x_test, y_test = generate_data(200, img_height, img_width, num_classes)

```

```

# Create the model
model = create_crnn_model((img_height, img_width, 1), num_classes)

```

```

# Train the model
history = model.fit(x_train, y_train, epochs=10, batch_size=32,
validation_split=0.1)

```

```

# Evaluate the model
test_loss, test_accuracy = model.evaluate(x_test, y_test)
print(f'Test accuracy: {test_accuracy:.4f}')

```

```

# Make predictions on the test set
predictions = model.predict(x_test)

```

```

# Display some predictions
def plot_predictions(images, predictions, true_labels, num=10):
    plt.figure(figsize=(10, 4))
    for i in range(num):
        plt.subplot(2, 5, i + 1)
        plt.imshow(images[i].reshape(img_height, img_width), cmap='gray')
        plt.title(f'Pred: {np.argmax(predictions[i])}, True:
{np.argmax(true_labels[i])}')

```

```
plt.axis('off')  
plt.show()
```

```
# Plot the first 10 test images and their predictions  
plot_predictions(x_test, predictions, y_test)
```