School of Computing and Information Systems

PROGRAM: BSC BUSINESS INTELLIGENCE AND DATA ANALYTICS

CSE301 - Intelligent Systems	**Year 3**	**Semester 1**

Assignment

Hand Out Date: 16-Sep-2022 **Hand In Date: 23-Nov-2022**

Total : 100%

Instructions to candidates

1. This assessment contains five sections. Candidates must attempt **all sections**
2. You are to make you submission on turn-it-in for the research task. You may consult with your tutor/lecturer on how this will be done.
3. Ensure that you have an account on turn-it-in by going to **www.turnitin.com**. Use the credentials provided for accessing this system. If you do not have them, get hold of the tutor/lecturer as soon as possible.
4. If there is code to be submitted ensure your folder has been created on the submission Server i.e. Teams, and you are able to submit inside the folder.
5. Any work with plagiarism level above **30 % will not be marked for research case studies.** It your responsibility to make sure that your plagiarism level is within this level. Monitor it on regular bases. If you share your solution with others, chances of the plagiarism rising above this level are high.
6. **It is your responsibility to ensure that you can see Intelligent Systems module on turn-it-in before submission date and you can submit your research paper on the module link/bin. Consult with your tutor/lecturer if this is not the case.**

Scenario

Alpha dreamers Banking consortium is a financial institution that provides business loans, savings accounts, and checking accounts for individuals and businesses. In their annual review, the board of directors for the institution saw it fit to enhance its internal operations to stay ahead of the competition. A new wing of business intelligence has been initiated to assist the loans department to automate, predict and formalize the business processes. The loans department has realized that there is a high defaulter rate for personal loans and measures must be put in place to minimize the defaulter rates. You are to develop a web-based application using Django that would be able to:

- Capture new client's details.
- Monitor the approvals and rejections.
- Monitor the payment records of all approved applications.
- Predict defaulters well in time and advice where necessary.

Section A Deliverables: 10% of the assignment:

Task 1: Create a virtual environment for your project and name it appropriately. [**4 points]**

Task 2: In your own words explain the following Django functions: ***[1 point each]***

startapp

startproject

migrate

runserver

makemigrations

sendtestmail

Task 3: Using VSCode make the necessary configurations on your project and then create an app within your project and make the necessary configurations. ***[10 points]***

Section B Deliverables: 20% of the assignment

Task 1: Creating templates. **[20 points]**

Using any html templates (You can create your own templates using css or download one.) create the frontend views that will allow the customer to apply for a loan and for the loan officer to capture and update payments(installments). The necessary forms must have all fields contained in the database model below.

Task 2: Creating database models. **[30 points]**

Create a database model for each app you have created and ensure that the following tables are in your project, The choice is yours to put them in a relevant app.

- loan_amortization
  - amortization_id – pk
  - control_number (a unique control for amortization)
  - date
  - payment_amount
  - interest_payment
  - principal_payed
  - remaining_balance
- loan_application
  - application_id – pk
  - control_number
  - cust_id – fk
  - loan_type_id – fk
  - mode_of_payment (over the counter, bank transfer, salary deduction, etc)
  - loan_amount
  - loan_duration
  - purpose
  - loan_status
  - remarks
  - processed_by – fk(user_id)
- Loan_type

    - Loan_type_id – pk
    - Loan_name
    - description
- Customers
    - Cust_id – pk
    - First_name
    - Surname
    - Complete_adress
    - Contact_number
    - Email_adress
    - Gender
    - Civil_status
    - Birthdate
    - Age
    - Profile_pic
    - Username
    - Password
    - Account_status
- Sms
    - Api_code
    - Api_password
    - Api_status
    - message
- sms_logs
    - sms_id
    - sent_date
    - cust_id – fk
    - message
- Users
    - User_id – pk
    - Full_name

    - Avatar
    - Username
    - Password
    - Contact
    - Email
    - User_group_id – fk
    - Status (active, inactive)
- user_groups
    - group_id – pk
    - group_name
    - description
- loan_payment
    - loan_payment_id – pk
    - payment_reference_number
    - cust_id - fk
    - date
    - payment_amount
    - proof_of_payment
    - payment_status (pending, accepted, rejected)
    - comments
    - reviewed_by(user_id) – fk

Task 3: Updating a database model. [**15 points]**

Add all the CRUD functionality to the above database from the front-end (i.e., Your app should allow the loan officer to add new entries into the system). For security reasons implement a role-based authentication mechanism by clearly defining your user roles.

Section C Deliverables: **50% of the assignment**

Use the data provided in the CSV file for this section. Note that the data provided is not related to the database model created in Section B.

Task 1: Analyse and visualize data. **[10 points]**

As a BI technician, one of the important skills in programming is visualizing data using the matplotlib module to provide insight into the data in the CSV file. Develop at least 2 diagrams and provide justification for your choices in relation to the scenario above.

Task 2: Clean your data. **[5 points]**

There are several ways of cleaning data, given the data provided curate it so that it is ready for machine learning and justify the approach you used.

Task 3: Develop machine learning models - logistic regression. **[10 points]**

Task 4: Build a deep learning model on the data. **[30 points]**

Task 5: Compare the logistic regression and deep learning. **[10 points]**

Section D Deliverables: **30% of the assignment**

This section assesses your ability to deploy a machine learning model created in section C.

Task 1: Create a new app and create a database model that has the same attributes found in the CSV file in section C. In the app create a view that will allow the user to capture data and apply the CRUD architecture. **[30 points]**

Task 2: Deploy the Machine learning model in section C into your application. **[25 points]**

Task 3: Your model should alert the user if the loan applicant is likely to default or not. **[5 points]**