**ASSIGNMENT-11: Artificial Neural Network**

For this project, we implement an Artificial Neural Network (ANN) model for binary classification of customer churn data.

**Connecting to the Google Drive**

In the first step of the code, we import the required libraries and connect to Google Drive to access the dataset.

**Importing the dataset (Data Preprocessing)**

The next step is to import the dataset and preprocess it. The data is read using the pandas module, and the 3rd and 4th columns of the dataset are stored in variables x and y, respectively. x contains the independent variables, and y contains the dependent variable. The print statements are used to display the data.

**Encoding the Categorical Data (Data Processing)**

In this section, categorical data is encoded using label encoding for the gender column and one-hot encoding for the country column. The ColumnTransformer class is used for one-hot encoding, and the resultant data is stored in the x variable.

**Splitting the data into Training and Test (Data Processing)**

The dataset is then split into training and test sets using the train\_test\_split method from the sklearn module. The data is split into an 80-20 ratio for training and testing, respectively.

**Feature Scaling**

The data is then standardized using the StandardScaler method from the sklearn module to bring all the features to a common scale.

**Initializing the ANN Model**

The Artificial Neural Network is then initialized using the Sequential class from the Keras API. The ANN consists of an input layer, two hidden layers, and an output layer. Each hidden layer has 6 neurons, and the activation function used is ReLU. The output layer has a single neuron with a sigmoid activation function.

**Training the ANN**

The ANN is trained on the training data using the compile and fit methods. The optimizer used is Adam, the loss function used is binary cross-entropy, and the metric used is accuracy. The batch size is set to 32, and the number of epochs is set to 100.

**Predicting the test results**

The trained ANN is then used to predict the test results. The predicted values are converted to binary format (0 or 1) using a threshold of 0.5.

**Making the confusion matrix**

The confusion matrix and accuracy score are then calculated using the confusion\_matrix and accuracy\_score methods from the sklearn module, respectively.