Group Project

CAR PRICE PREDICTION USING ANN

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Introduction

The Car Price Prediction using ANN project aims to predict customers' budgets for car purchases based on their background and economic state, benefiting car salespeople, dealers, and financial institutions by estimating loan amounts and sorting budget-friendly cars.

Initiating processes

- **Business case**

A business case outlines the project's purpose, including its definition, summary, mission statement, product/services, organization, and expected value.

- **Project charter**

A project charter is a precise document outlining the project's goals, stakeholders, purpose, resources, risks, and milestones, providing proof of approval, ensuring stakeholder approval, and documenting project information.

Planning processes

- **Work breakdown structure**

A work breakdown structure (WBS) is a project management tool that breaks down the project into smaller components and integrates scope, cost, and deliverables. It makes it easier for team members to identify their jobs in the project.

- **Scope statement**

A scope statement is a comprehensive project outline, outlining objectives, deliverables, boundaries, and requirements, serving as a crucial tool for stakeholders and teammates to measure project success.

- **Project schedule**

An extensive timeline outlining the tasks, activities, and deadlines necessary to finish a project is called a project schedule. We used the Gantt Chart to visualize our project's schedule.

Cost estimation

- **Net Present Value**

The difference between the present value of cash inflows and outflows over a specific time is known as the net present value or NPV. It's a critical metric for assessing a project's potential profitability.

- **Payback analysis**

Payback analysis is a mathematical method used to determine how long it may take to start, complete, and pay for a project's investment/capital.

- **Return on investment**

A metric called return on investment (ROI) is used to indicate how much profit has been made from an investment.

- **Internal Rate of return**

Internal Rate of return can be defined as the rate at which cash inflows equal cash outflows without consideration of external factors.

Executing processes

Coding
This project uses Python for coding a neural network model, including data input, preprocessing, feature selection, normalization, train test split, ANN architecture, activation function, optimizer usage, and performance evaluation.

Flowchart
The flowchart consists of all the processes made in the model development which are data input, data preprocessing, feature selection, normalization, train test split, use of ANN architecture, adding activation function, optimizer usage, and model performance evaluation.

Dataset
The car_purchasing.csv dataset contains 500 customer data including name, email, country, gender, age, annual salary, credit card debt, net worth, and car purchase amount. The data is continuous and qualitative, allowing for the creation of a model to estimate car purchase costs based on given features. The dataset can be downloaded from Kaggle.

Executing processes

Model development
The development of an ANN model involves splitting the dataset into training and testing sets, with the training set being used for training and the testing set for performance evaluation. The model is built on the training data and tested on the testing data, with a test size of 0.2 determining the data splitting.

Training and testing
The function trains a model for a fixed number of epochs, returning a History object with training loss, metrics, and validation loss values. It evaluates the model's performance on the training dataset and validation data, checking for overfitting. The model then makes predictions based on the output, using the R-squared score to evaluate its performance on the test data. The R-squared score measures how well the model's predictions align with the actual values, ranging from 0 to 1, with 1 indicating a perfect fit.

Monitoring and controlling processes

- **Performance reports**

Project performance reports measure project metrics, inform stakeholders, and monitor task performance, providing a comprehensive overview of milestones and progress.

- **Updates on plan**

Updates on plan refers to the update that we do in the existing plan, based on the changes requested by people involved in the project. This is to ensure to keep track of the updates that we made in the plan and look for its accomplishment.

- **Requested changes**

A change request form is a form used to request, approve, and track project-related changes. We need to specify who requested the change and its description, reason to change, change's priority and the impact of the changes towards the deliverables.

Closing processes

- **Final report**

A final project report is a final document containing the services, results, and performance of a project, assessing its success, history, strengths, weaknesses, and lessons learned for future evaluation.

- **Lesson learned**

Lessons learned project management involves assessing team experiences to identify areas for improvement, best practices, and opportunities for future projects to prevent mistakes and enhance quality.

- **Project archives**

A project archive refers to the systematic storing of project artifacts such as project charter, work breakdown structure, cost estimate, performance report and so on at the close of a project, that is related to our project.

Project implementation

The project utilized Google Colaboratory for Python coding and trained a model using MinMaxScaler and a Sequential model with ReLU and linear activation function. The model was compiled with ADAM optimizer and tested on 100 epoch size data to predict car prices based on individual factors.

GitHub Link

GitHub

Conclusion

The study discusses the use of artificial neural networks (ANN) for car price prediction, highlighting its potential for profitable pricing decisions. ANN models estimate automobile prices based on various features, such as brand, model, engine specifications, fuel efficiency, mileage, and production year. The study also discusses the development of derived features or transformations to improve the model's prediction ability. The model's performance was assessed using metrics like MAE, MSE, and R-squared. To maintain accuracy, the model should be continuously monitored and updated with fresh data.

THANK YOU