'B.M.S. COLLEGE OF ENGINEERING BENGALURU
Autonomous Institute, Affiliated to VTU

An Internship Report
Machine Learning Intern

Submitted in partial fulfillment for the award of degree of

Bachelor of Engineering
in
Computer Science and Engineering

Submitted by:
G SAI VIKRANT
1BM21CS061

Internship Carried Out

at

Afame Technologies
Ramchandrapura, Jalahalli, Bangalore

Internal Guide   **External Guide**

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Assistant Professor   Business Analyst
BMS College of Engineering   Afame Technologies

B.M.S COLLEGE OF ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DECLARATION

I, G Sai Vikrant (1BM21CS061) student of 6thSemester, B.E, Department of Computer Science and Engineering, BMS College of Engineering, Bangalore, hereby declare that, this Internship entitled "**Machine Learning Intern**", has been carried out under the guidance of Afame Technologies, **Rekha GS,** Assistant Professor, Department of CSE, BMS College of Engineering, Bangalore during the academic semester March - June 2024. I also declare that to the best of my knowledge and belief, the Internship report is not a part of any other report by any other student.

Signature of the Candidate

G Sai Vikrant (1BM21CS061)

B.M.S. COLLEGE OF ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CERTIFICATE

This is to certify that the Internship titled "Machine Learning Intern" has been carried out by G Sai Vikrant(1BM21CS061) during the academic year 2023-2024.

Signature of the Guide   Signature of the Head of the Department

Signature of Examiners with date

1. Internal Examiner   _____

2. External Examiner   _____

20.04.2024

Dear G Sai Vikrant,

We are delighted & excited to welcome you to Afame Technologies as a **"Machine Learning Intern"**. At Afame Technologies,we believe that our team is our biggest strength and we take pride in hiring ONLY the best and the brightest. We are confident that you would play a significant role in the overall success of the venture and wish you the most enjoyable, learning-packed and truly meaningful internship experience with Afame Technologies.

We look forward to you joining us. Please do not hesitate to contact us for any information you may need. Also, Please sign the duplicate of this offer as your acceptance and forward the same to us.

You can reach out to us at **internship@afame.in** for any assistance or clarification.

We are excited about the opportunity to work with you and look forward to your positive response.

Congratulations!

Mr. Ashish Kumar
Founder & C.E.O.

Signature:

Name: G Sai Vikrant
Date: 20.04.2024

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Abstract

The goal of the internship was to provide a dynamic learning environment where a person can contribute meaningfully to the company's community and further an individual's professional and personal development. During my internship at Afame Technologies, I was tasked with predicting employee churn, aiming to identify individuals who might leave the company. This project was critical for the company to understand retention dynamics and implement strategies to improve employee satisfaction and retention rates. The primary objective was to develop a predictive model that accurately forecasts whether an employee would leave the company. This involved understanding various factors contributing to employee churn and building a robust predictive model using advanced machine learning techniques A significant aspect of the internship was delving into artificial neural networks (ANNs) and their implementation using PyTorch. Neural networks are computational models inspired by the human brain's network of neurons. They consist of layers of interconnected nodes (neurons) that process data by adjusting weights based on input signals. Neural networks excel in tasks such as image and speech recognition, natural language processing, and predictive analytics. Training involves feeding data through the network and using algorithms like backpropagation to minimize error. They are a foundational technology in deep learning, driving advancements in artificial intelligence.

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Chapter 1

About the Company:

- Afame Technologies provide services of Web Designing, Online Marketing and Business Growth Consult.

- The company was founded in 2019.

- The company helps in growing people's business digitally. They have been providing their services from more than 5 year to across the globe.

- Services they include: Digital Marketing | Web Development | Data Science & Analytics | Marketing & Sales Consultation

- Size of the organization: 50-60 employees

- Departments under Organization:

  - Website Development Team

  - Digital Marketing Team

  - Social Media Management Team

  - Business Consultancy Team

- Optimizing business listings on Google to improve local visibility and attract potential customers. Google My Business optimization ensure that your business appears prominently in local search results.

- Improving website's visibility in search engine results and driving organic traffic with our SEO services. We optimize your website's content, structure, and keywords to ensure it ranks high on search engine pages

Chapter 2

About the Company's Department:

Afame Technologies specializes in providing digital marketing solutions tailored to enhance the online visibility of small and medium-sized enterprises (SMEs). Our core offerings include Search Engine Optimization (SEO), social media marketing, and our flagship service - Google My Business Optimization. Each department at Afame Technologies plays a pivotal role in delivering these services, ensuring that our clients achieve optimal results in their digital marketing efforts.

Google My Business Optimization Department:

The Google My Business (GMB) Optimization department is dedicated to helping businesses improve their local search visibility. This service is crucial for SMEs aiming to attract nearby customers and enhance their local market presence.

Functions and Responsibilities:

1. **Business Listing Management:**
   - **Claiming and Verifying Listings:** Ensuring that the business listings on Google My Business are claimed and verified to prevent unauthorized changes and maintain accuracy.
   - **Information Updates:** Regularly updating business information, including address, contact details, hours of operation, and services offered.
2. **Content Optimization:**
   - **Keyword Integration:** Researching and integrating relevant local keywords into the business description and posts to enhance search visibility.
   - **Photo and Video Uploads:** Uploading high-quality photos and videos that showcase the business, its products, and services to attract and engage potential customers.
3. **Customer Engagement:**
   - **Review Management:** Monitoring and responding to customer reviews to build trust and improve customer relationships.

- ○ **Post Creation:** Creating and scheduling posts about offers, events, and updates to keep the audience engaged and informed.
4. **Performance Analysis:**
   - ○ **Insights Monitoring:** Analyzing GMB Insights to track performance metrics such as search views, map views, and customer actions.
   - ○ **Reporting:** Providing clients with detailed reports on their GMB performance and recommendations for further improvement.

Tools and Techniques:

- ● **Google My Business Dashboard:** Primary tool for managing and optimizing business listings.
- ● **SEO Tools:** Utilized for keyword research and performance tracking.
- ● **Analytics Tools:** Used for in-depth analysis of customer engagement and search visibility metrics.

Chapter 3

Tasks Performed:

Churn Prediction of Employees:

Dataset:

It is the dataset of a U.S. bank customer for getting the information that , this particular customer will leave bank or not.

Link for dataset:

https://drive.google.com/file/d/1zV1I9dszFiFTXPUMIwjyQ5FdNHTjicM2/view?usp=drive_link

Objective:

Develop a model to predict employee churn for a business. Use employee record data, including features like salary, age etc. and try algorithms like

Logistic Regression, Neural Networks to predict churn.

Dataset:

JoiningYear	PaymentTier	Age	Gender	EverBenched	ExperienceInCurrentDomain	LeaveOrNot	Education_Bachelors	Education_Masters	Education_PHD	City_Bangalore	City_New Delhi	City_Pune
2012	3	37	0	1	0	0	1	0	0	1	0	0
2017	2	28	0	1	4	0	0	1	0	0	1	0
2017	2	36	0	1	3	0	1	0	0	0	1	0
2015	3	27	0	0	5	0	1	0	0	1	0	0
2017	3	29	0	1	4	0	1	0	0	1	0	0
2013	3	22	1	0	0	0	1	0	0	1	0	0
2016	3	37	0	1	2	0	1	0	0	1	0	0
2015	3	23	0	1	1	0	1	0	0	1	0	0
2013	2	31	1	1	2	1	1	0	0	0	0	1
2017	2	30	1	1	2	0	0	1	0	0	1	0
2013	3	25	0	1	3	0	0	0	1	0	1	0
2014	3	23	0	1	1	0	1	0	0	1	0	0
2018	3	26	0	1	4	1	1	0	0	1	0	0
2016	3	40	0	1	5	0	1	0	0	1	0	0
2017	2	37	1	1	0	1	1	0	0	0	0	1
2014	1	30	1	1	3	0	1	0	0	0	1	0
2012	3	29	0	1	3	0	1	0	0	0	1	0
2018	2	34	1	1	0	1	1	0	0	0	1	0
2017	2	29	1	1	2	1	1	0	0	0	0	1
2014	3	30	0	0	4	0	1	0	0	0	0	1
2015	3	36	0	1	1	0	1	0	0	1	0	0
2017	2	23	0	1	1	0	0	1	0	0	1	0
2013	3	30	0	1	3	1	1	0	0	1	0	0
2014	3	36	0	1	0	0	1	0	0	1	0	0
2015	3	39	0	1	4	0	1	0	0	0	0	1
2014	3	23	1	1	1	0	1	0	0	1	0	0
2012	3	27	0	1	5	0	0	0	1	0	1	0
2013	3	35	0	1	2	0	0	1	0	0	1	0
2017	2	34	0	1	0	0	0	1	0	0	1	0
2013	3	30	1	1	1	0	1	0	0	1	0	0

Fig.3.1: Dataset

Analysis of Dataset:

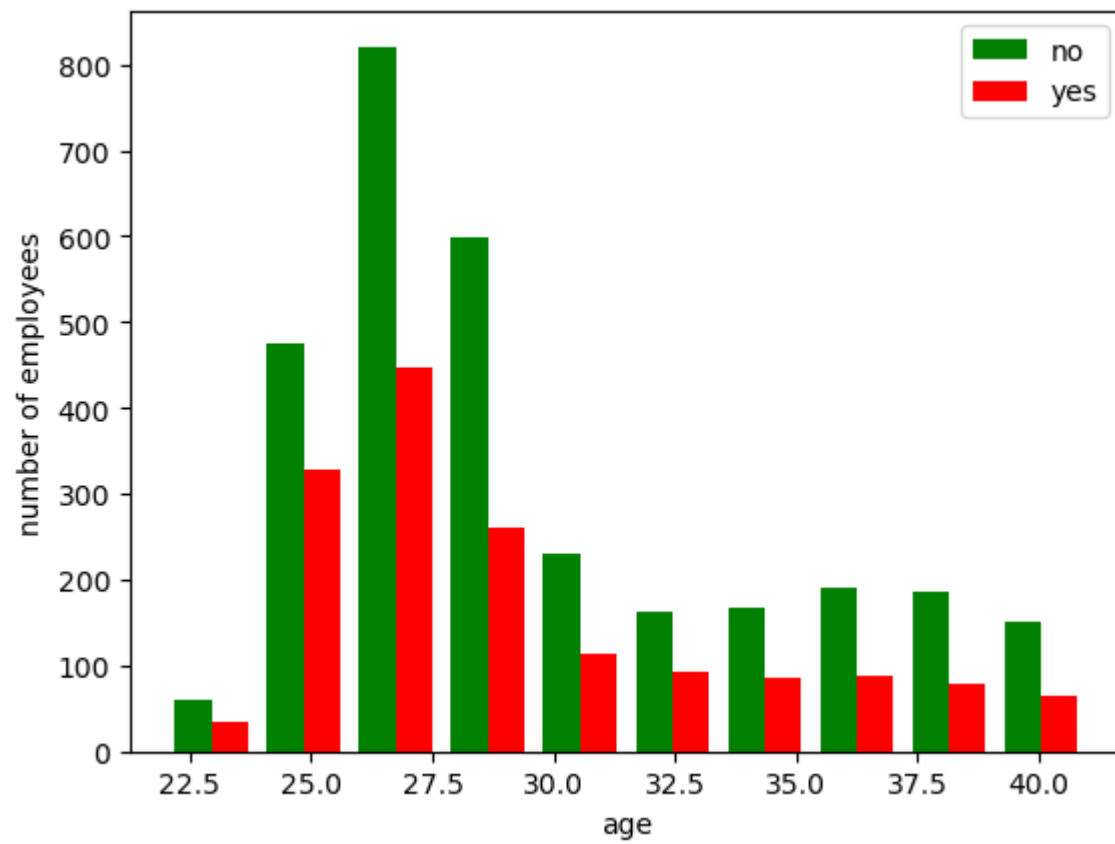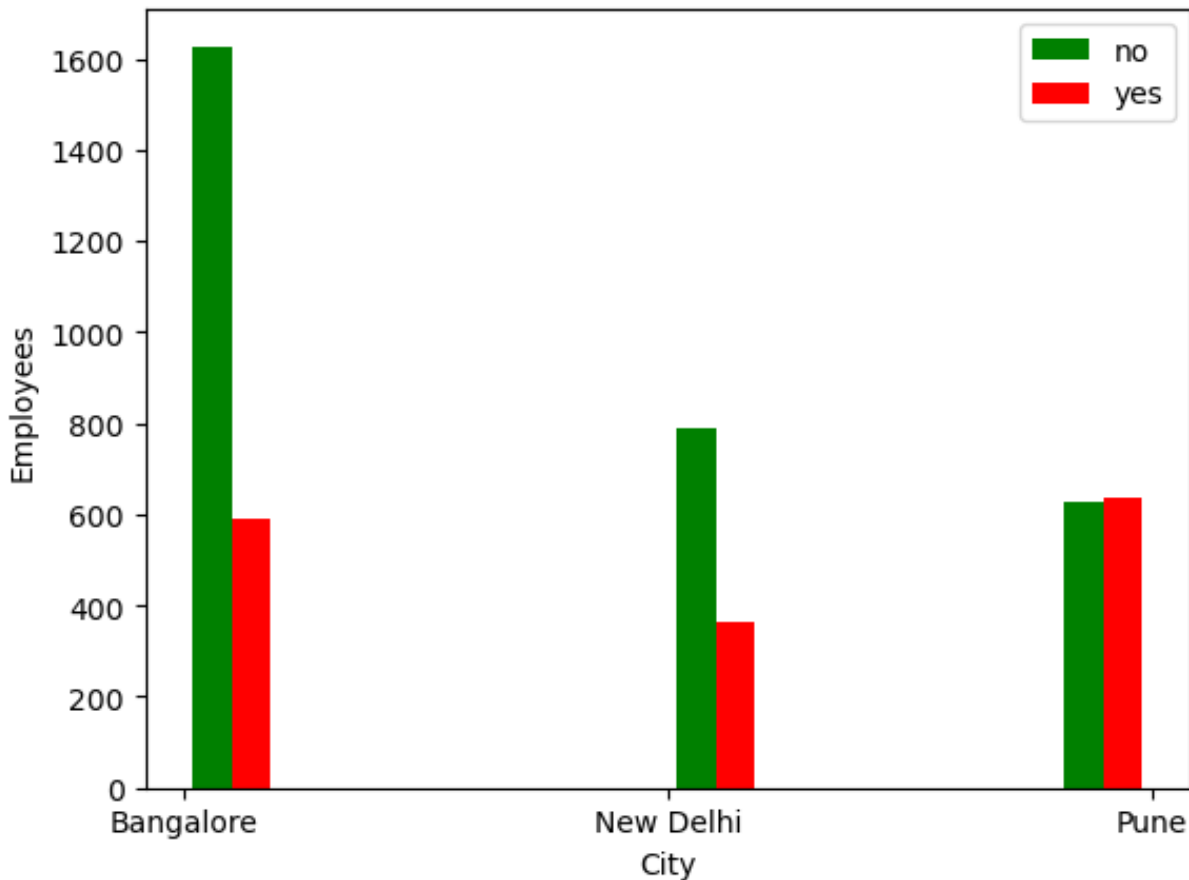
Fig.3.2: Analysis of two features

Fig.3,3: Analysis of Number of Employees in cities

Code Samples:

```python
class Salary_Predictor(nn.Module):
    '''
    Purpose:
    ---
    The architecture and behavior of your neural network model will be
    defined within this class that inherits from nn.Module. Here you
    also need to specify how the input data is processed through the layers.
    It defines the sequence of operations that transform the input data into
    the predicted output. When an instance of this class is created and data
    is passed through it, the `forward` method is automatically called, and
    the output is the prediction of the model based on the input data.

    Returns:
    ---
    `predicted_output` : Predicted output for the given input data
    '''
    def __init__(self, input_features=10, hidden1=80, hidden2=80, output_features=1):
        super(Salary_Predictor, self).__init__()
        self.fc1 = nn.Linear(input_features, hidden1)
        self.fc2 = nn.Linear(hidden1, hidden2)
        self.out = nn.Linear(hidden2, output_features)

    def forward(self, x):
        #x = x.requires_grad_()
        x = F.leaky_relu(self.fc1(x))
        x = F.leaky_relu(self.fc2(x))
        '''x = F.sigmoid(self.out(x))
        x = (x >= 0.5).float().requires_grad_()'''
        x = self.out(x)
        #x = x.long()

        return x
```

Fig.3.4: Class for Neural Network

```python
def data_preprocessing(task_1a_dataframe):

    '''
        Purpose:
        ---
        This function will be used to load your csv dataset and preprocess it.
        Preprocessing involves cleaning the dataset by removing unwanted features,
        decision about what needs to be done with missing values etc. Note that
        there are features in the csv file whose values are textual (eg: Industry,
        Education Level etc)These features might be required for training the model
        but can not be given directly as strings for training. Hence this function
        should return encoded dataframe in which all the textual features are
        numerically labeled.

        Input Arguments:
        ---
        `task_1a_dataframe`: [Dataframe]
                                            Pandas dataframe read from the provided dataset

        Returns:
        ---
        `encoded_dataframe` : [ Dataframe ]
                                            Pandas dataframe that has all the features mapped to
                                            numbers starting from zero

        Example call:
        ---
        encoded_dataframe = data_preprocessing(task_1a_dataframe)
        '''

    #################    ADD YOUR CODE HERE    ##################
    df = task_1a_dataframe

    df['Education'].replace({"Bachelors":0,"Masters":1,"PHD":2},inplace=True)
    df['Gender'].replace({"Male":0,"Female":1},inplace=True)
    df['EverBenched'].replace({"No":0,"Yes":1},inplace=True)
    MinMx = MinMaxScaler()
    Scaled_columns = ['Age', 'JoiningYear','ExperienceInCurrentDomain']
    df[Scaled_columns] = MinMx.fit_transform(df[Scaled_columns])
    df = pd.get_dummies(columns=['City'],data=df,dtype=int)



    # Display the encoded DataFrame
    #df_encoded = df_encoded.astype(int)

    encoded_dataframe = df
    ##########################################################

    return encoded_dataframe
```

Fig.3.5: Method for Preprocessing of Dataset

Backend Development:

Github Link: https://github.com/SaiVikrantG/NodeJS-Tutorials

```javascript
app.get(
  "/tweets/:tweetId/replies/",
  authenticate,
  async (request, response) => {
    const { tweetId } = request.params;
    const dbQuery = `SELECT username FROM user WHERE user_id = (SELECT follower_user_id FROM follower WHER

    const res = await db.get(dbQuery);

    if (res.username === request.username) {
      response.status(401);
      response.send("Invalid Request");
    } else {
      const query = `SELECT user.name,reply.reply FROM user INNER JOIN reply ON user.user_id = reply.user_
      const replies = await db.all(query);

      console.log({ replies });
      response.send({ replies });
    }
  }
);

app.get("/user/tweets/", authenticate, async (request, response) => {
  const { username } = request;

  const dbQuery = `SELECT tweet, FROM ((user INNER JOIN tweet ON user.user_id = tweet.user_id) as a INNER
});

app.post("/user/tweets/", authenticate, async (request, response) => {
  const { tweet } = request.body;
  const { username } = request;
  const query = `SELECT user_id FROM user WHERE username = '${username}';`;
  const res = await db.get(query);
  // Create a new Date object
  const currentDateTime = new Date()
    .toISOString()
    .slice(0, 19)
    .replace("T", " ");
  console.log(currentDateTime);

  const dbQuery = `INSERT INTO tweet(tweet,user_id,date_time) VALUES('${tweet}','${res.user_id}','${curren

  await db.run(dbQuery);
```

Fig.3.6: Backend Script

Chapter 4

Reflection Notes

My internship at Afame Technologies as a Machine Learning intern has been a transformative experience, offering me a blend of technical and non-technical learning opportunities.

Outcomes:

1. **Hands-on Experience with Machine Learning Models**: During my internship, I had the opportunity to work on various machine learning projects. I was involved in developing and fine-tuning models for predictive analysis, which included tasks like data cleaning, feature engineering, and model evaluation.

2. **Practical Knowledge of Tools and Frameworks**: I became proficient in using machine learning tools and frameworks, Scikit-learn, and PyTorch. This hands-on experience allowed me to understand the practical applications of these tools, far beyond the theoretical knowledge I gained in my coursework.

3. **Data Analysis and Visualization**: I improved my skills in data analysis and visualization using Python libraries such as Pandas, NumPy, and Matplotlib.

4. **Time Management**: Balancing projects and course work was a crucial part of my internship. I developed effective time management skills, learning to prioritize tasks based on their importance and urgency.

5. **Resource Utilization Skills**: I learned to make the most of the resources available to me. Whether it was utilizing online courses to learn new tools or seeking mentorship from other developers online, I understood the importance of leveraging all available resources to enhance my learning and productivity.

REFERENCES AND ANNEXURES

- https://pytorch.org/docs/stable/index.html
- https://www.gradio.app/docs
- https://nodejs.org/docs/latest/api/
- https://python.langchain.com/v0.2/docs/introduction/
- https://expressjs.com/