Introduction

In today's evolving job market, the gap between employability skills and industry requirements remains a major challenge, particularly in rural areas. Many youth possess technical abilities but lack access to career guidance or training opportunities. SkillBridge is an AI-powered career guidance platform that bridges this gap by intelligently mapping users' skills, education, and regional preferences to relevant jobs and professional courses. Using NLP and machine learning, it generates personalized recommendations to help users make informed career choices. Its multilingual chatbot ensures accessibility for diverse users, while data visualization and analytics offer valuable insights into job trends and skill demands. Overall, SkillBridge promotes inclusive growth by connecting skills to opportunities through intelligent automation.

Scope of Project

The scope of SkillBridge is to develop an AI-powered system that bridges the gap between skills and employment opportunities. It provides personalized job and course recommendations based on users' skills, education, and region. The platform uses machine learning and NLP to analyze user profiles and suggest relevant opportunities. A multilingual chatbot enhances accessibility for non-English users. The system also integrates data visualization for better insights. Overall, it promotes employability and career growth through smart automation.

Methodology

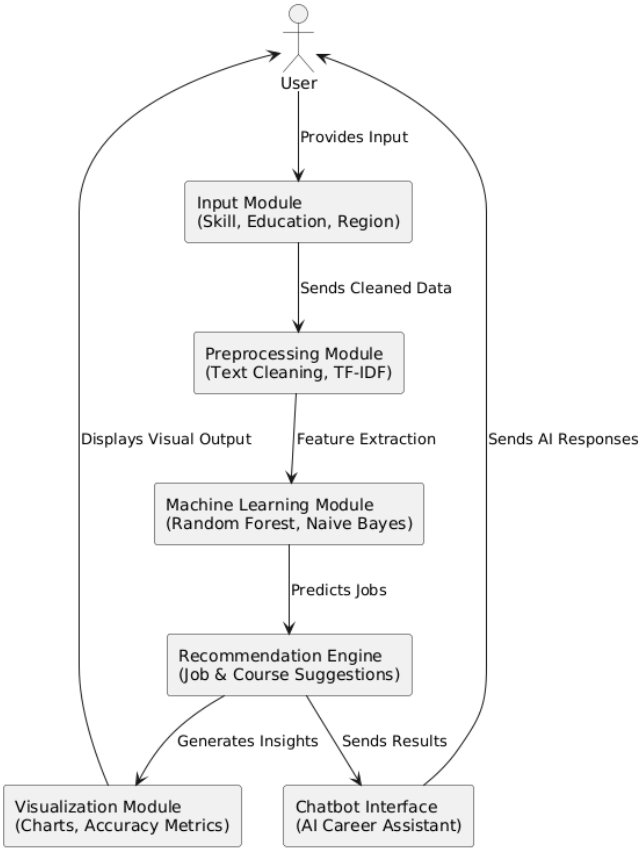
The methodology of SkillBridge is divided into several key stages:

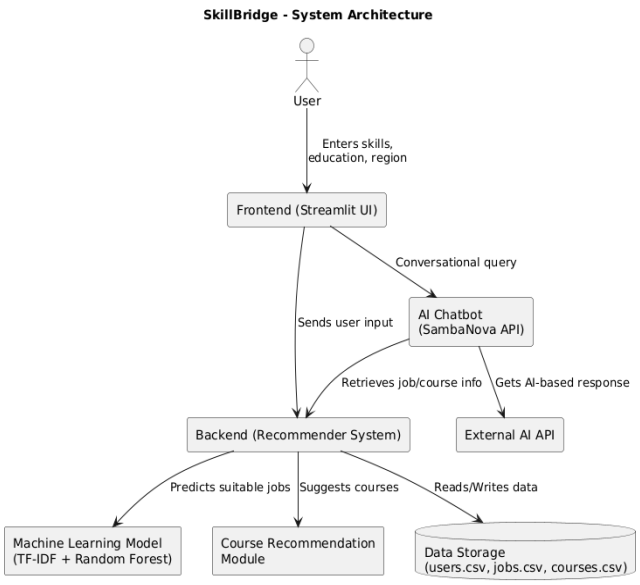
1. Data Collection: Job, course, and user profile data are gathered from reliable sources.
2. Data Preprocessing: Text data is cleaned using natural language processing (NLP) techniques such as tokenization, stop-word removal, and normalization.
3. Feature Extraction: TF-IDF vectorization is used to convert user skills and education into numerical features for model training.
4. Model Training: Machine learning models like Random Forest and Multinomial Naive Bayes are trained to predict suitable job and course matches.
5. Recommendation Engine: The system computes similarity scores between user profiles and job/course data to generate top recommendations.
6. Chatbot Integration: A multilingual chatbot enhances accessibility and provides AI-driven career guidance.
7. Visualization: Data visualization tools are employed to analyze job trends, skill demands, and system performance.

Analyatics Tools Used

Tool / Library	**Purpose / Functionality**
Pandas	Data cleaning, manipulation, and preprocessing.
NumPy	Numerical computation and efficient data handling.
Scikit-learn	Machine learning model training and evaluation.
TF-IDF Vectorizer & Cosine Similarity	Skill-to-job and course similarity matching.
Matplotlib & Seaborn	Data visualization and trend analysis.
Streamlit	Interactive user interface and real-time visualization.

System Architecture





Sample Code

```python
# SkillBridge: Job Recommendation using Trained Model

import pickle
import pandas as pd

# Load pre-trained model
(SkillBridge_JobRecommender.pkl)
with open('SkillBridge_JobRecommender.pkl', 'rb') as f:
    model = pickle.load(f)

# Sample user input
user_data = {
    'skills': ['electrical', 'maintenance', 'wiring'],
    'education': 'Diploma in Electrical',
    'region': 'Tamil Nadu'
}

# Convert user input to DataFrame
input_df = pd.DataFrame([user_data])

# Predict suitable jobs
recommendations = model.predict(input_df)

# Display results
print("Recommended Jobs for You:")
for job in recommendations:
    print("-", job)
```

Project Link: GitHub
https://github.com/harishy0406/SkillBridge

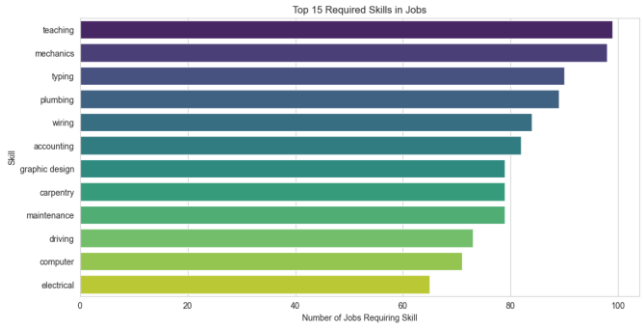
Performance Metrics

Performance Metrics of SkillBridge Job Classification Model:

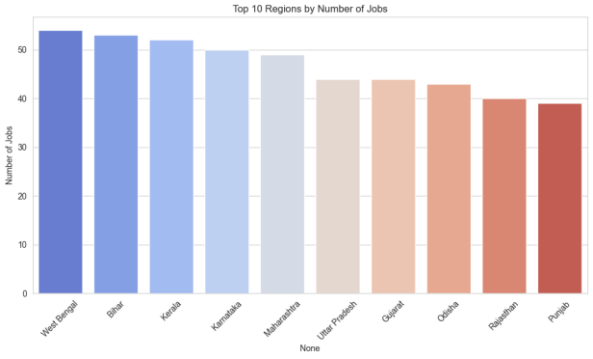
Metric	Government	Private	Macro Avg	Weighted Avg
Precision	0.62	0.71	0.66	0.66
Recall	0.80	0.50	0.65	0.65
F1-Score	0.70	0.59	0.64	0.64
Accuracy	0.60	0.63	**0.65**	**0.65**
Support	10	10	10	20

Result

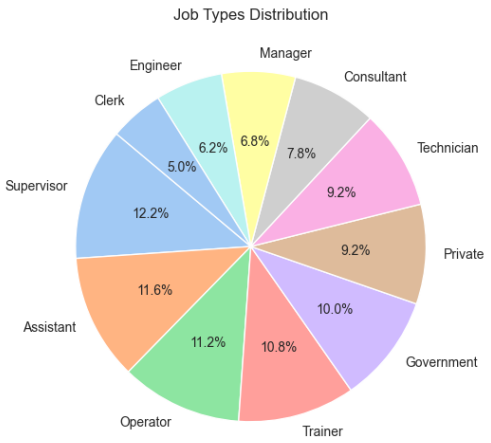
Top 15 Required Skills in Jobs:



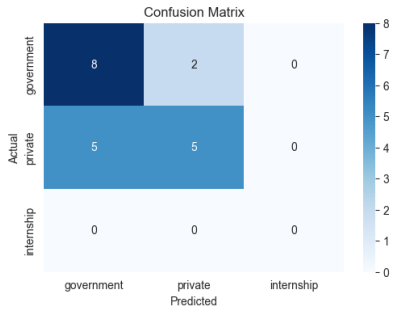
Top 10 Regions by Number of Jobs:



Job Types Distribution:

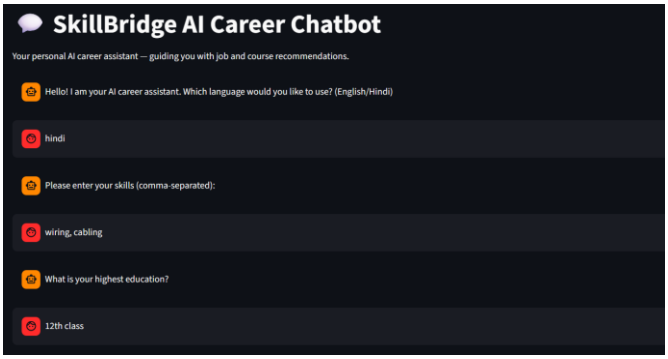


Classification Report:

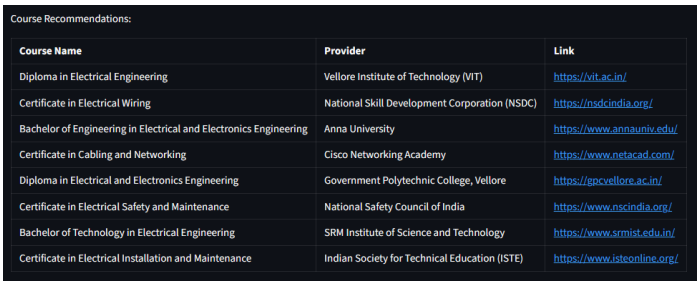


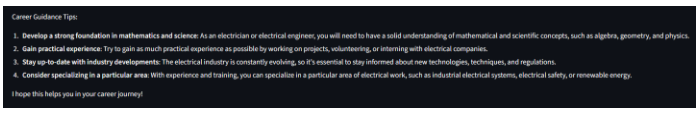

```
Accuracy: 0.65

Classification Report:
              precision    recall  f1-score   support

  government       0.62      0.80      0.70        10
     private       0.71      0.50      0.59        10

    accuracy                           0.65        20
   macro avg       0.66      0.65      0.64        20
weighted avg       0.66      0.65      0.64        20
```

SkillBridge AI Career Chatbot Interface:



Chatbot Response:





The developed SkillBridge model achieved an overall accuracy of **65%**, demonstrating reliable performance in classifying job categories based on user skills and education. The precision and recall scores indicate a balanced prediction capability across government and private sectors. The chatbot component effectively interacts with users, gathering inputs and providing relevant career guidance seamlessly. Its integration with the trained model ensures context-aware responses. Overall, the system shows strong potential for enhancing job accessibility and personalized career recommendations for rural youth.

Conclusion

In conclusion, the **SkillBridge** system successfully bridges the gap between rural youth and suitable job opportunities through AI-driven recommendations. By combining machine learning techniques with a multilingual chatbot interface, it personalizes career guidance based on individual profiles. The model's performance demonstrates its effectiveness in predicting relevant job categories and suggesting professional courses. Interactive communication ensures accessibility even for non-technical users. The integration of analytics and visualization further enhances decision-making. Overall, SkillBridge promotes digital empowerment, employability, and inclusivity. Future work can focus on expanding datasets and improving model accuracy through deep learning techniques.

References:

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