Experiment - 10

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Track: - AI

Aim:

Program to solve AI Fairness issue.

Software Required:

PyCharm

Theory:

Fairlearn is an open-source Python library developed by Microsoft Research. It is designed to support fairness in machine learning models by providing tools and techniques to assess and mitigate bias and discrimination in AI systems. Fairlearn is a valuable resource for researchers, data scientists, and developers working on projects that require ethical considerations and fairness in machine learning.

Algorithm:

```python
from fairlearn.metrics import demographic_parity_difference
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score
import pandas as pd
import numpy as np

# Generating Data
np.random.seed(0)
n_samples = 1000
n_features = 5
X = np.random.rand(n_samples, n_features)
y = (X[:, 0] + X[:, 1] > 1).astype(int)
sensitive_feature = (X[:, 2] > 0.5).astype(int)
data = pd.DataFrame(data={'feature1': X[:, 0], 'feature2': X[:, 1], 'sensitive_feature': sensitive_feature, 'target': y})

# Feature Selection
data_encoded = pd.get_dummies(data, columns=['sensitive_feature'], drop_first=True)
X = data_encoded.drop(columns=['target'])
y = data_encoded['target']

# Splitting Data
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=0)
model = LogisticRegression()
model.fit(X_train, y_train)

# Testing Accuracy
y_pred = model.predict(X_test)
accuracy = accuracy_score(y_test, y_pred)
dp_diff = demographic_parity_difference(y_test, y_pred, sensitive_features=X_test['sensitive_feature_1'])
print("Accuracy:", accuracy*100)
print("Demographic Parity Difference:", dp_diff)
```

Applications:

- Recruitment and Hiring
- Criminal Justice
- Advertising and Recommendations

Output:

```
Accuracy: 98.5
Demographic Parity Difference: 0.055371319465380375

Process finished with exit code 0
```