Title: Applying deep learning methods to solve an applicaton.

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Aim:

Applying deep learning for spam mail detection.

Algorithm:

```python
# Import libraries
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.feature_extraction.text import CountVectorizer
from sklearn.naive_bayes import MultinomialNB
from sklearn.metrics import accuracy_score, precision_score, recall_score, f1_score

# Load dataset
data = pd.read_csv('spam_data.csv')

# Preprocess data
data['text'] = data['text'].str.lower()
data['text'] = data['text'].str.replace('[^\w\s]','')
data['text'] = data['text'].str.replace('\d+', '')
data['text'] = data['text'].str.strip()

# Split data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(data['text'], data['label'],
test_size=0.2, random_state=42)

# Extract features from text using bag-of-words
vectorizer = CountVectorizer()
X_train = vectorizer.fit_transform(X_train)
```

```python
X_test = vectorizer.transform(X_test)

# Train Naive Bayes classifier
clf = MultinomialNB()
clf.fit(X_train, y_train)

# Make predictions on test data
y_pred = clf.predict(X_test)

# Evaluate performance
accuracy = accuracy_score(y_test, y_pred)
precision = precision_score(y_test, y_pred, pos_label='spam')
recall = recall_score(y_test, y_pred, pos_label='spam')
f1 = f1_score(y_test, y_pred, pos_label='spam')

print("Accuracy: ", accuracy)
print("Precision: ", precision)
print("Recall: ", recall)
print("F1 Score: ", f1)
```

Output:

	Category	Message
0	ham	Go until jurong point, crazy.. Available only ...
1	ham	Ok lar... Joking wif u oni...
2	spam	Free entry in 2 a wkly comp to win FA Cup fina...
3	ham	U dun say so early hor... U c already then say...
4	ham	Nah I don't think he goes to usf, he lives aro...
...	...	...
5567	spam	This is the 2nd time we have tried 2 contact u...
5568	ham	Will ü b going to esplanade fr home?
5569	ham	Pity, * was in mood for that. So...any other s...
5570	ham	The guy did some bitching but I acted like i'd...
5571	ham	Rofl. Its true to its name

5572 rows × 2 columns

```
emails=[
    'Sounds great! Are you home now?',
    'Will u meet ur dream partner soon? Is ur career off 2 a flyn
g start? 2 find out free, txt HORO followed by ur star sign, e.
g. HORO ARIES'
]
```

```
0.9777458722182341
```

Result:

Successfully Implemented NLP Program for spam mail detection.