

# Exploring the impact of machine learning algorithms with unlabelled data

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## 1 Introduction

In the current digital age, many recruiters seek to find suitable candidates through multiple channels — e.g., online job portals, professional networks — as well as traditional avenues, such as word of mouth and mass media (Shenoy and Aithal, 2018).

The dataset is derived from the large dataset called *mycareersfuture* (Bhola et al., 2020). The dataset has a total of 17377 data, consisting of 13902 train data, 1738 validation data, and 1737 test data. The dataset is shown in the table 1:

Table 1: Dataset Information

Data Type	Labeled	Unlabeled	Total
Train	8000	5902	13902
Validation	1738	-	1738
Test	-	1737	1737
Total	9738	7639	17377

To answer the question "Does Unlabelled data improve Job salary prediction?", We will analyse and compare the performance of different machine learning algorithms for this dataset (labelled and unlabelled data) and finally explore whether unlabelled data can be effectively combined to increase the performance of the model.

## 2 Literature review

## 3 methods

### 3.1 supervised learning

### 3.2 unsupervised learning

### 3.3 semi-supervised learning

we will use the architecture shown in figure 2 to train the model.

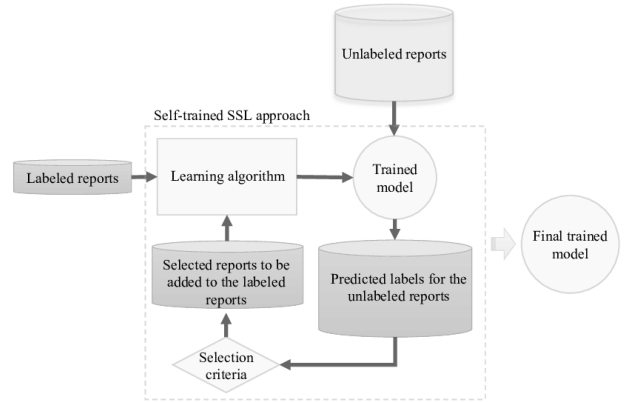


Figure 1. Self-trained semi-supervised learning architecture (Hassanzadeh et al., 2018)

## 4 Results

## 5 Discussion / Critical Analysis

## 6 Conclusions

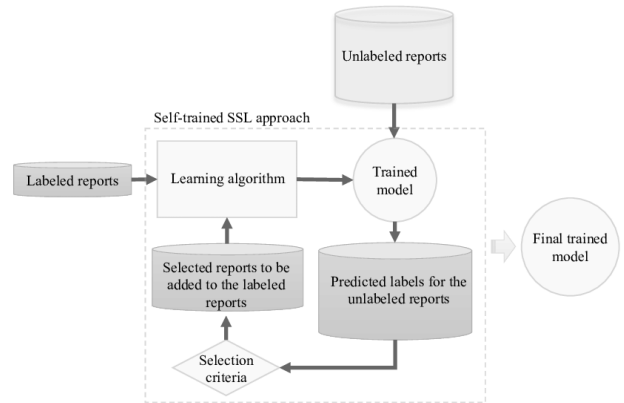


Figure 2. Self-trained semi-supervised learning architecture (Hassanzadeh et al., 2018)

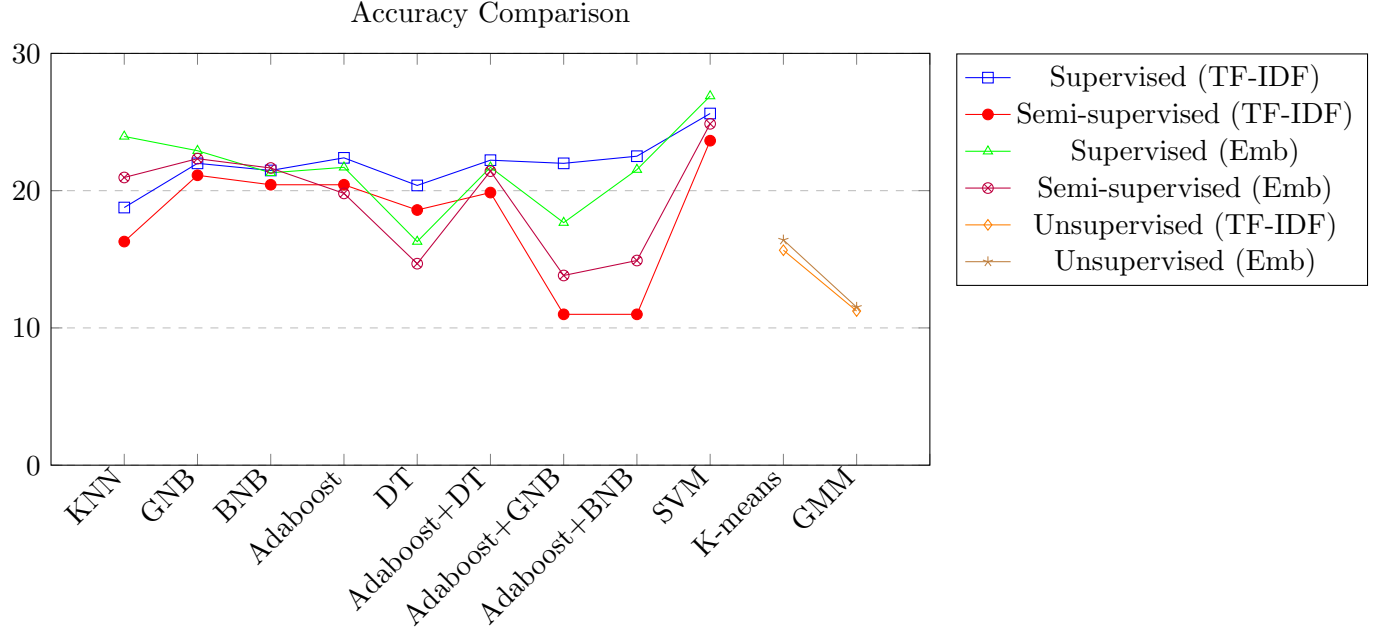


Table 2: Accuracy Comparison

Model	TFIDF		Embedding	
	Labaled data	Unlabeled data	Labaled data	Unlabeled data
KNN	18.77	16.29	23.95	20.96
GNB	21.99	21.12	22.91	22.33
BNB	21.47	20.43	21.3	21.65
Adaboost	22.39	20.43	21.7	19.8
Decision Tree (DT)	20.38	18.59	16.29	14.68
Adaboost + DT	22.22	19.86	21.7	21.42
Adaboost + GNB	21.99	10.99	17.67	13.82
Adaboost + BNB	22.51	10.99	21.53	14.91
SVM	<b>25.62*</b>	<b>24.64*</b>	<b>26.89*</b>	<b>24.87*</b>
K-means	-	<b>15.66*</b>	-	<b>16.41*</b>
GMM	-	11.23	-	11.51

## References

Bhola, A., Halder, K., Prasad, A., and Kan, M.-Y. (2020). Retrieving skills from job descriptions: A language model based extreme multi-label classification framework. In *Proceedings of the 28th International Conference on Computational Linguistics*, pages 5832–5842, Barcelona, Spain (Online). International Committee on Computational Linguistics.

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