deep learning method for semi-supervised sentiment classification

Machine Learning Presentation

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INTRODUCTION

- Sentiment classification
- Semi-supervised learning
- Active learning
- Deep learning

Active deep network (ADN)

Problem statement

- In natural language processing community, sentiment classification based on insufficient labeled data is a well-known challenging problem.

- a novel semi-supervised learning algorithm called active deep network (ADN) is proposed to address this problem

Motivation

- the related works of senti-ment classification have been extended
- an active learning method called **IADN** is proposed
- more experiments have been conducted to evaluate the performance of deep architecture

Research scope & assumption

First

Introduces a new deep architecture

Second

Proposes two effective active learning methods (ADN,IADN)

Third

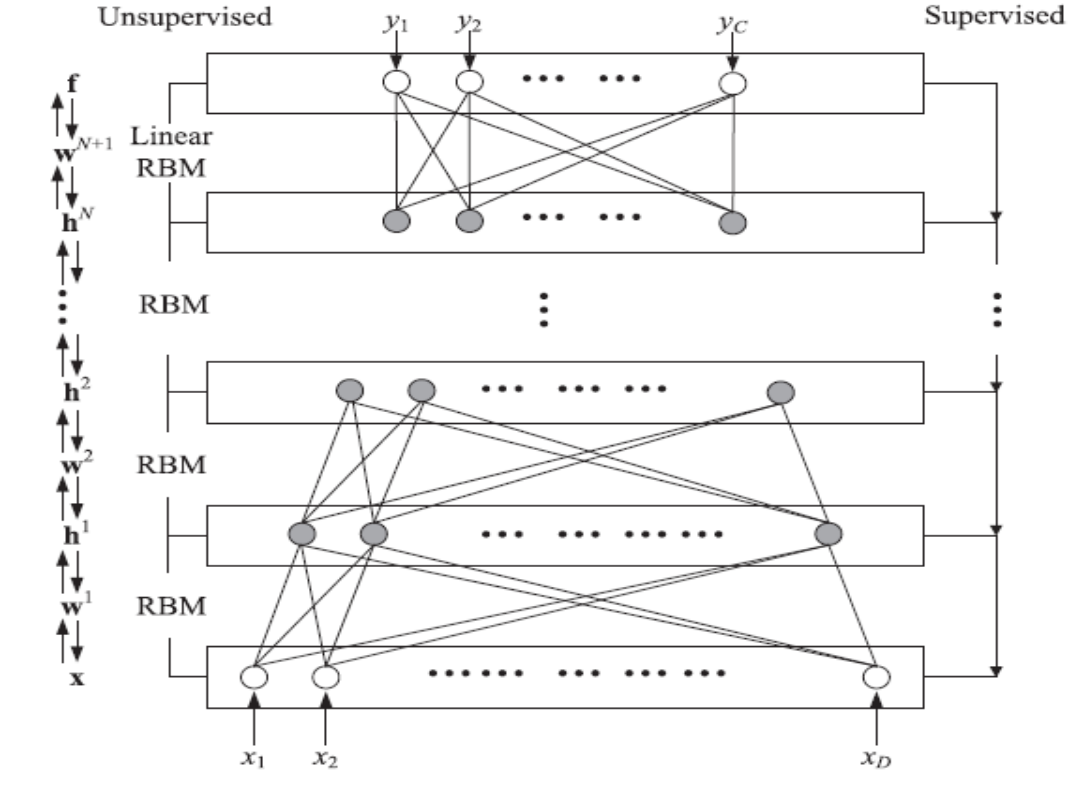
Applies semi-supervised learning and active learning

Fourth

Experimental results

Methodology

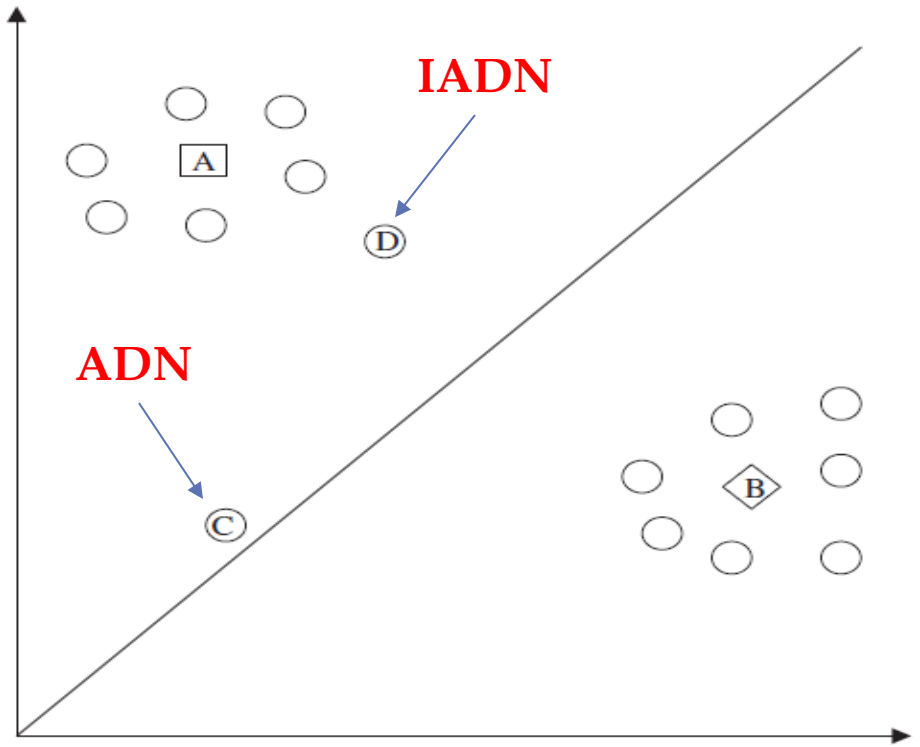
- **Semi-supervised learning**
- **Active learning**



Architecture of active deep networks **(ADN)**

Methodology

Information ADN **(IADN)**



EXPERIMENTS

- 1. How do ADN and IADN perform when compared with other state-of-the-art semi-supervised learning methods for sentiment classification?
- 2. How do ADN and IADN perform when compared with semi-supervised learning method based on our proposed deep architecture?
- 3. How does information density performs when there are few labeled data?
- 4. How does deep architecture performs for different loss functions?
- 5. How does varying the number of labeled reviews affect the performance of ADN and IADN?
- 6. How does varying the number of unlabeled reviews affect the performance of ADN and IADN?

EXPERIMENT(1)

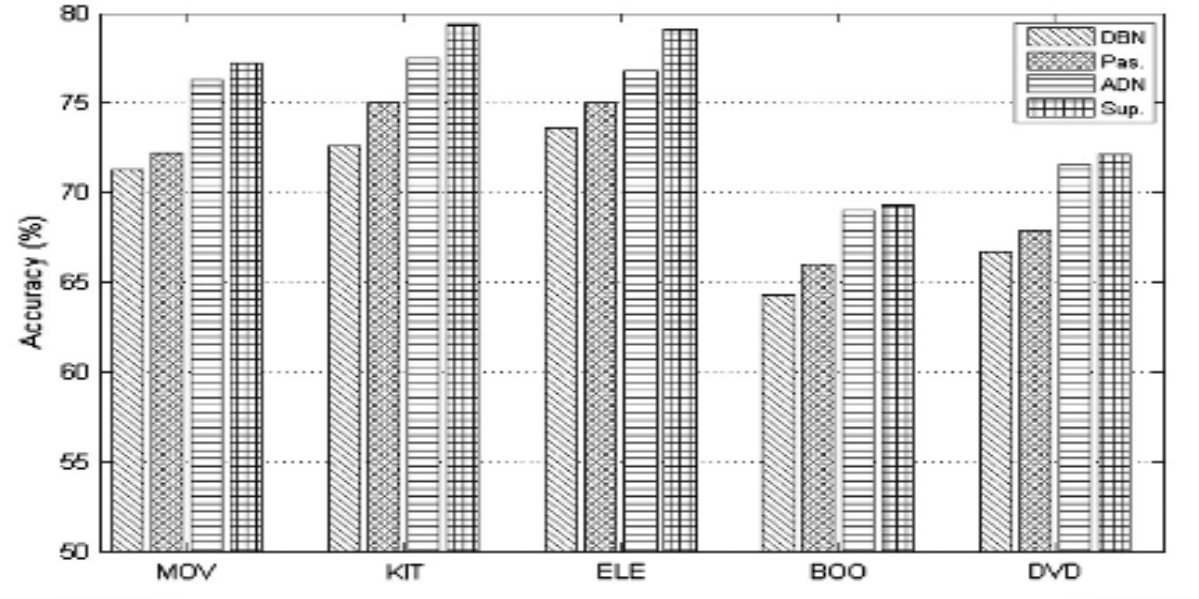
1. How do ADN and IADN perform when compared with other state-of-the-art semi-supervised learning methods for sentiment classification?

Test accuracy with 100 labeled reviews for five datasets and eight methods.

Type	MOV	KIT	ELE	BOO	DVD
Spectral	67.3	63.7	57.7	55.8	56.2
TSVM	68.7	65.5	62.9	58.7	57.3
Active	68.9	68.1	63.3	58.6	58.0
MECH	76.2	74.1	70.6	62.1	62.7
DBN	71.3	72.6	73.6	64.3	66.7
RAE	66.3	69.4	68.2	61.3	63.1
ADN	76.3	77.5	76.8	69.0	71.6
IADN	**76.4**	**78.2**	**77.9**	**69.7**	**72.2**

EXPERIMENT(2)

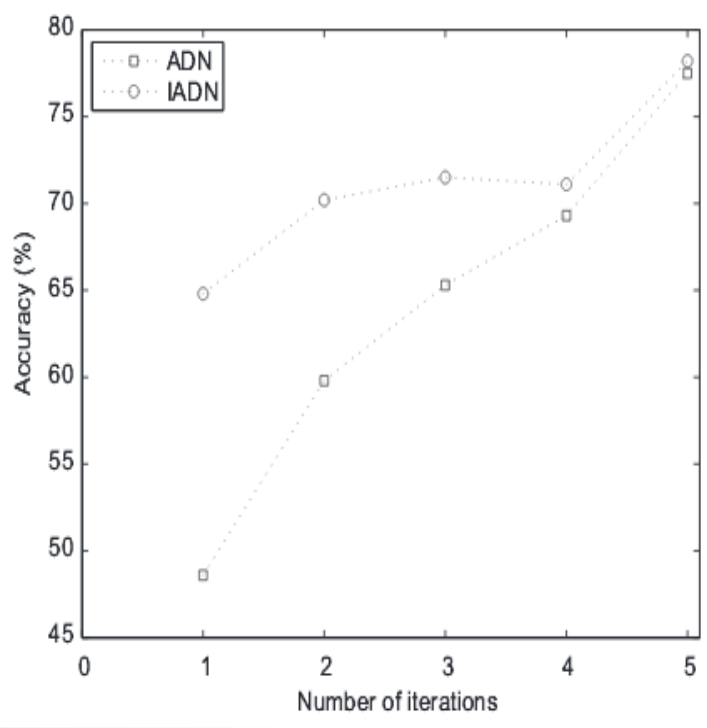
2. How do ADN and IADN perform when compared with semi-supervised learning method based on our proposed deep architecture?



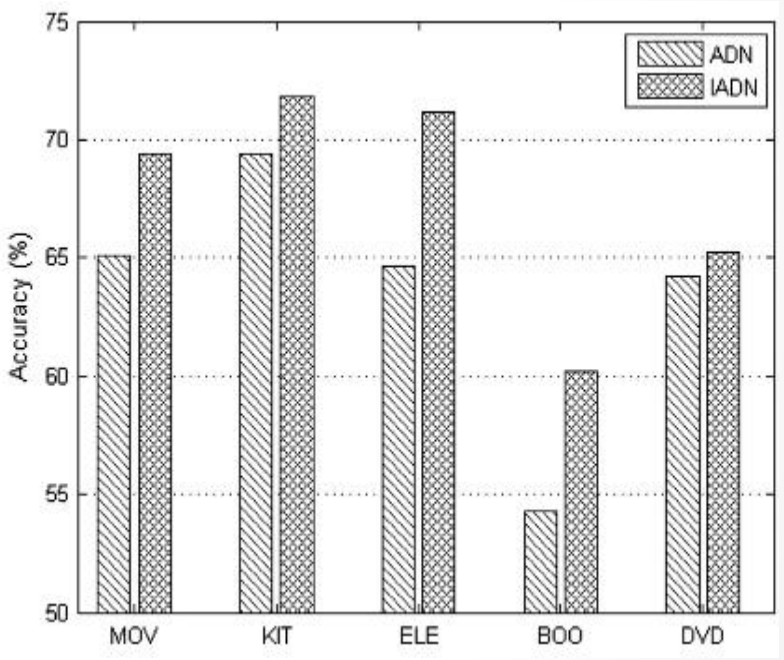
Test accuracy of DBN and ADN with different experiment setting on five datasets

EXPERIMENT(3)

3. How does information density performs when there are few labeled data?



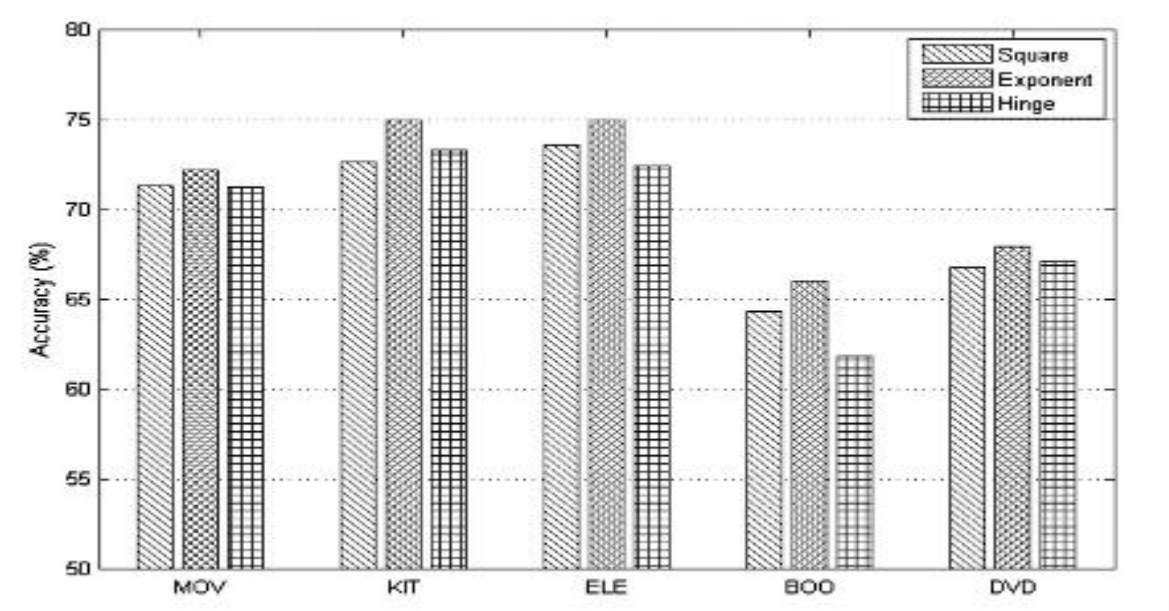
Performance curve of ADN and IADN with iterations of active learning.



Test accuracy of ADN and IADN with 10 labeled reviews on five datasets.

EXPERIMENT(4)

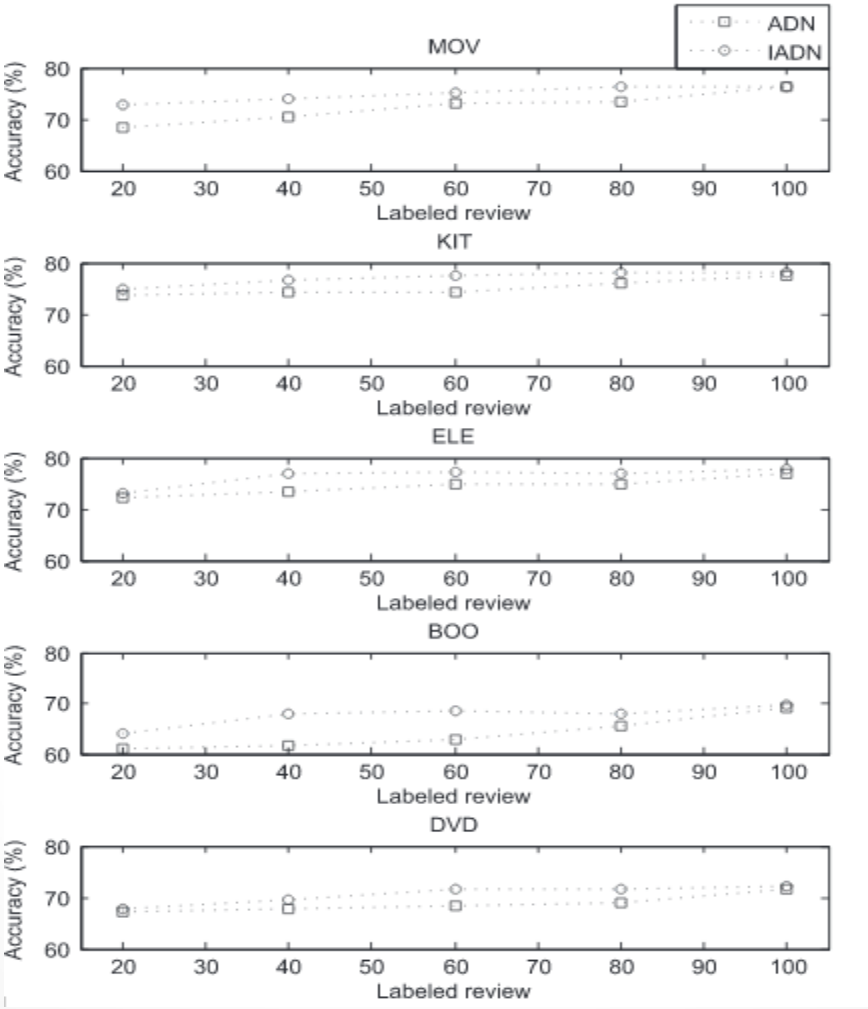
4. How does deep architecture performs for different loss functions?



Test accuracy of deep architecture with different loss function on five datasets

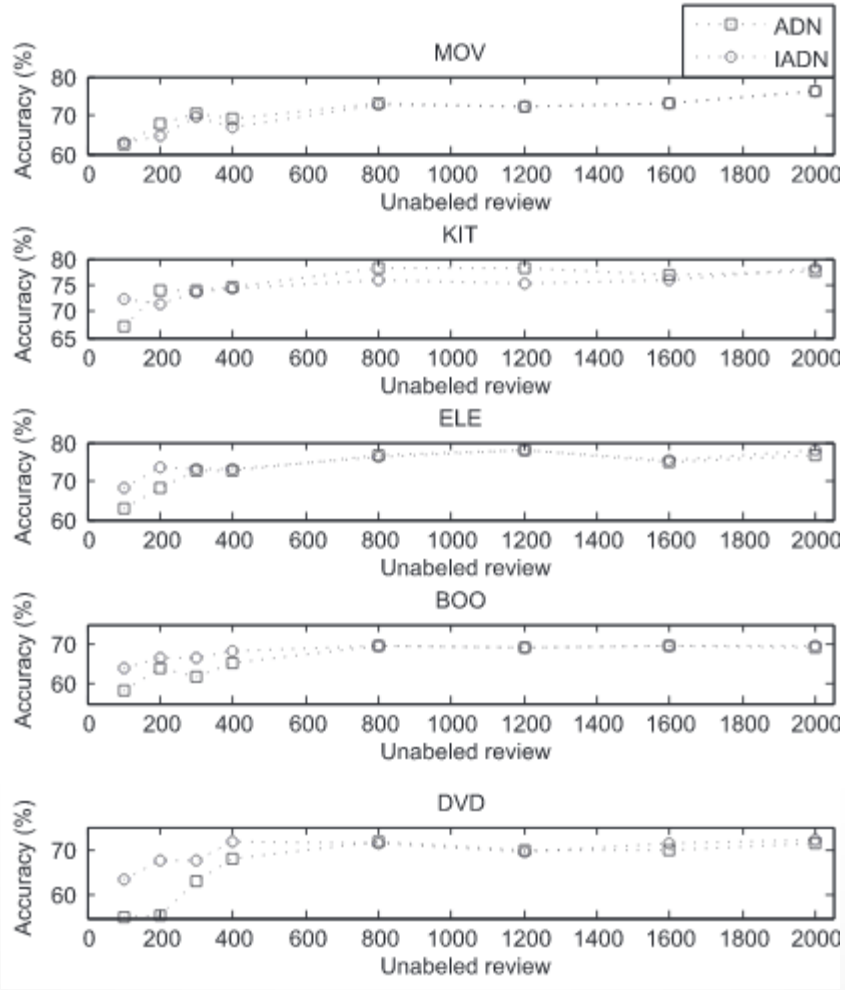
EXPERIMENT(5)

5. How does varying the number of labeled reviews affect the performance of ADN and IADN?



EXPERIMENT(6)

6. How does varying the number of unlabeled reviews affect the performance of ADN and IADN?



CONCLUSION

- semi-supervised learning algorithm **ADN**
- propose a new architecture and use an exponential loss function
- Propose **IADN** method
- performance of ADN and IADN is compared with existing semi-supervised learning methods

Thanks for your attention !