Emotion Recognition from Korean Text

Computer Science and Engineering, POSETCH

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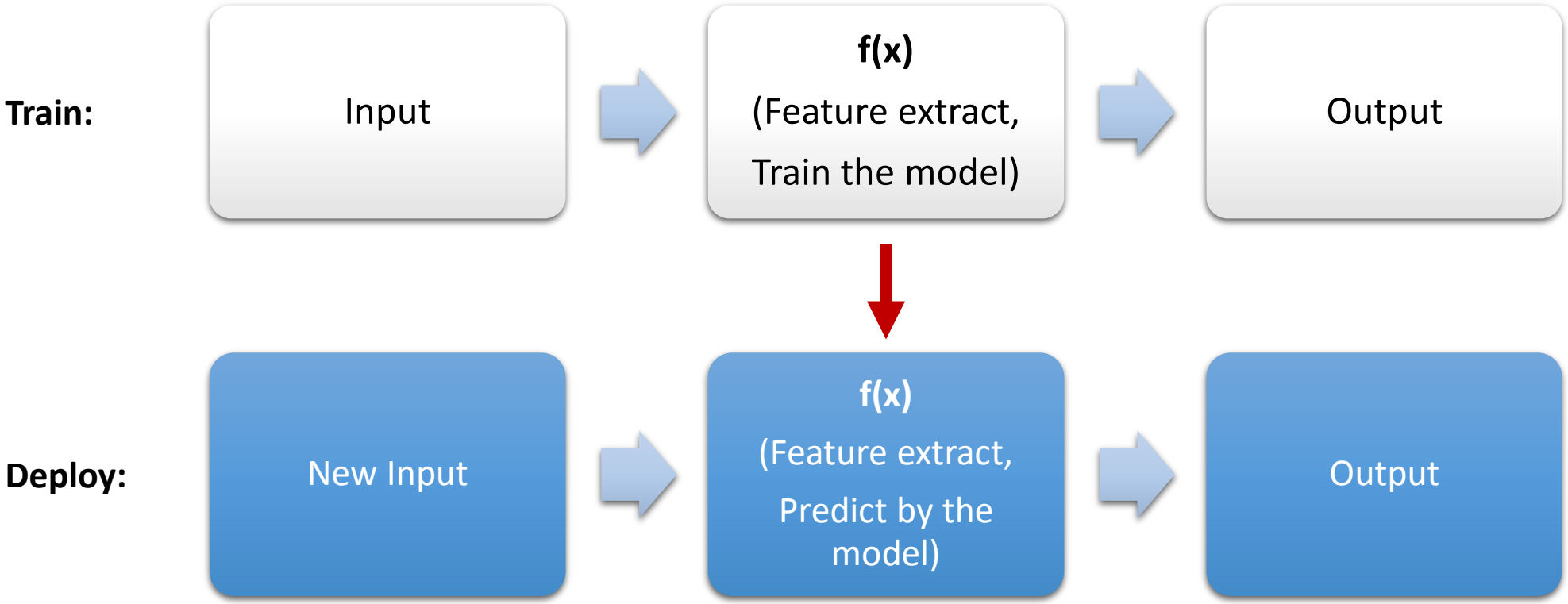
Introduction and Motivation

- Recognize emotion from text with machine learning.
- With this project,
  - We are able to understand thought or emotion about one person, product, company, accident subject, etc.
  - We are able to understand user's emotion in various kinds of SNS and messenger and develop new useful applications by using it.
  - We are able to detect and observe happiness of citizen, which depends on social, economic and environment factors.

Goal of Project

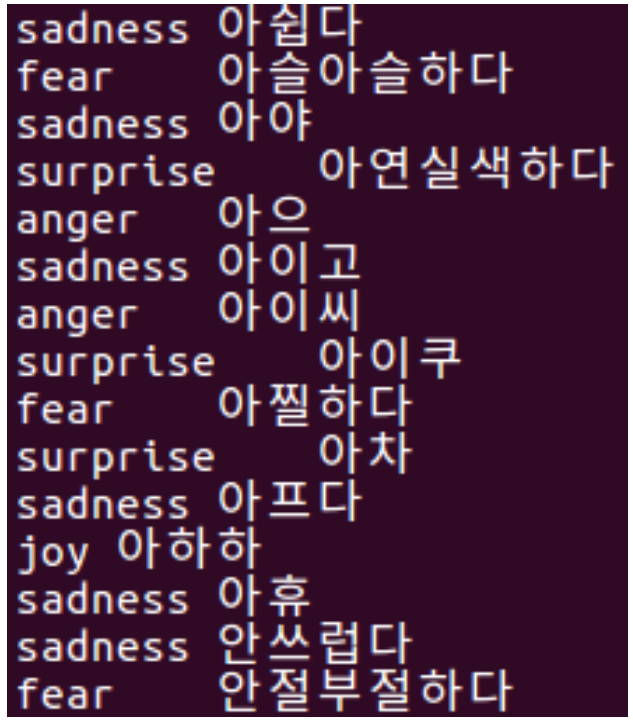
- Read text and recognize emotion with classifiers.
  - Emotion labels include 7 kinds of emotion.
    - Love, joy, surprise, anger, sadness, fear and neutral.
- Compare performances of all classifiers.

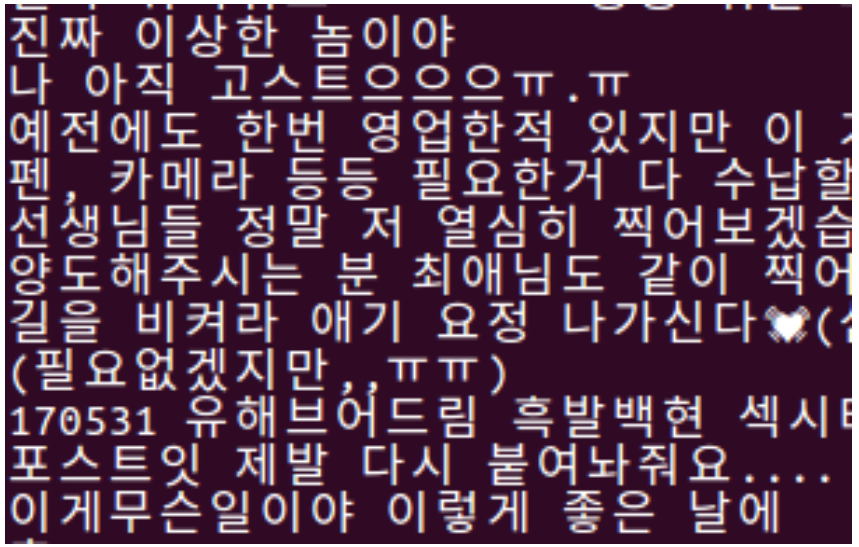
Overall Structure

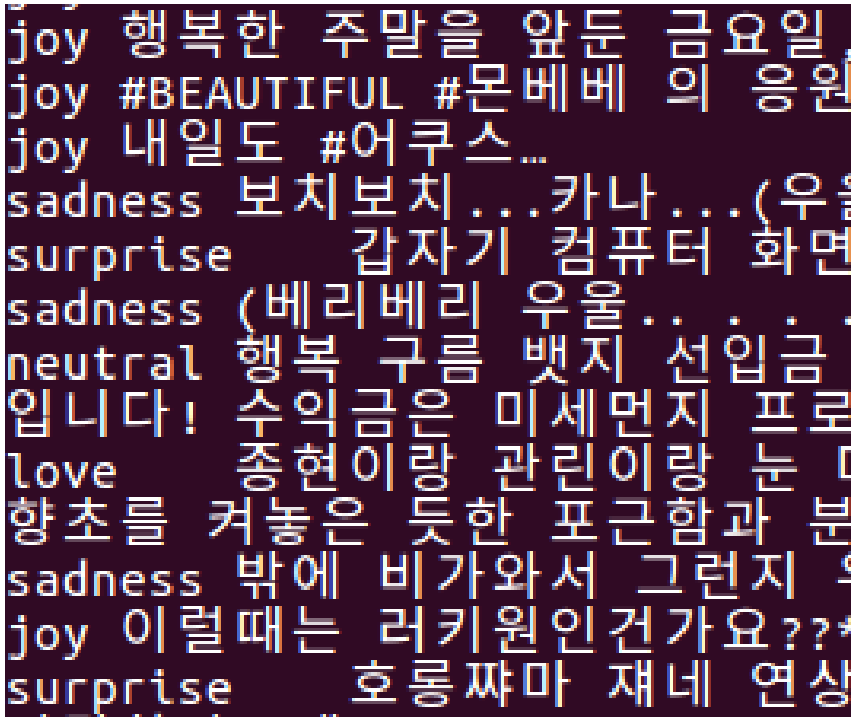


Method

- Make base emotion data and crawl text data for train and test from Twitter.







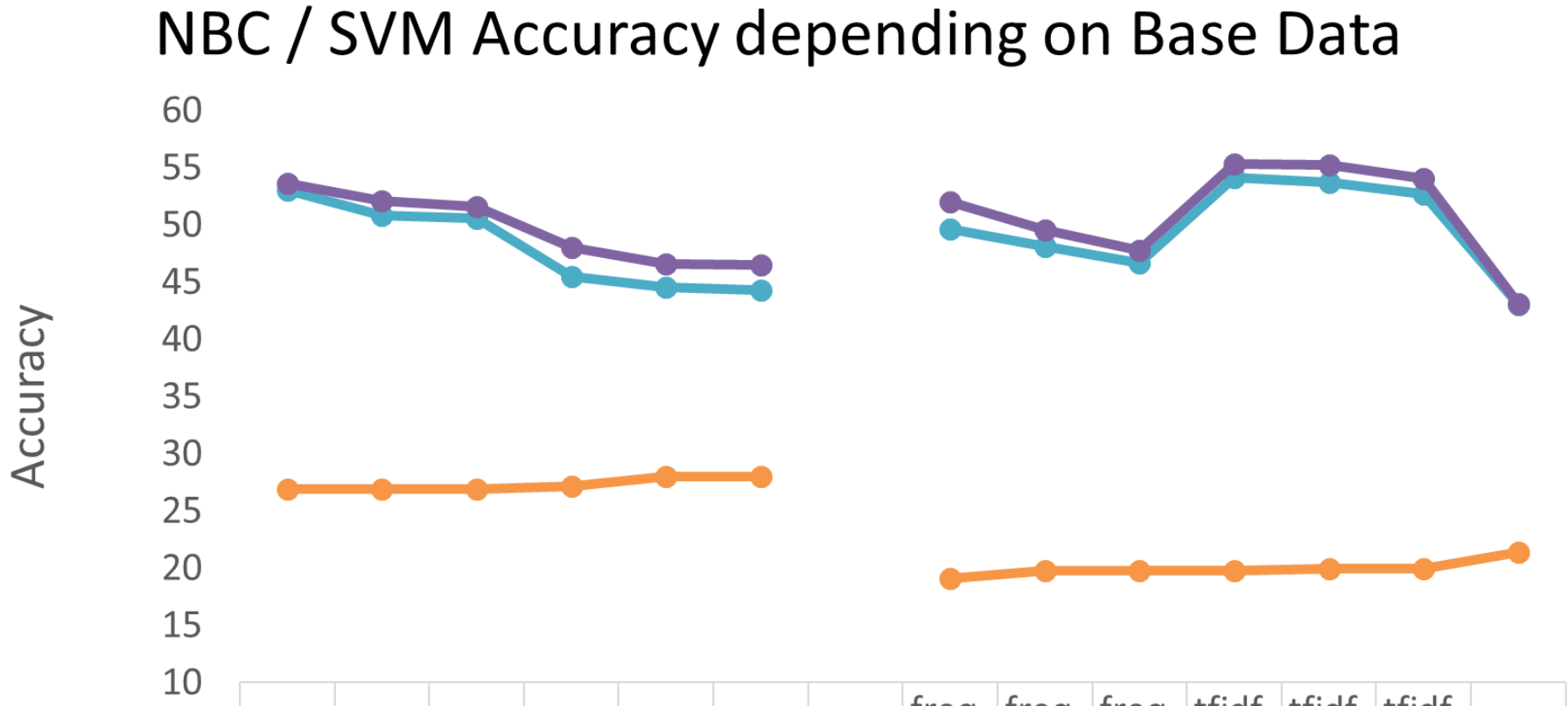
Method

- Implement various kinds of textual emotion classifiers with various methods and evaluate.
  - Consider **pre-processing** with
    - Morphological analysis, etc.
  - Consider **feature extractor** with
    - Word count, TFIDF, phrase, etc.
  - Implement **various classifiers**.
    - Naïve Bayes, SVM, RNN

Method

- Evaluate the performances.
  - Calculate accuracy with 5-fold cross validation.
  - $Accuracy = \frac{true\ pos + true\ neg}{true\ pose + false\ pos + true\ neg + false\ neg}$

Result



	freq-1	freq-2	freq-3	tfidf-1	tfidf-2	tfidf-3		freq-1-linear	freq-2-linear	freq-3-linear	tfidf-1-linear	tfidf-2-linear	tfidf-3-linear	rbf, poly
Only Base	26.9	26.9	26.9	27.2	28	28		19.1	19.7	19.8	19.8	19.9	19.9	21.4
No Base	53	50.8	50.5	45.5	44.5	44.3		49.6	48.1	46.7	54.1	53.7	52.7	43
Base+Train	53.6	52.1	51.6	48	46.6	46.5		52	49.6	47.8	55.3	55.2	54.1	43.1

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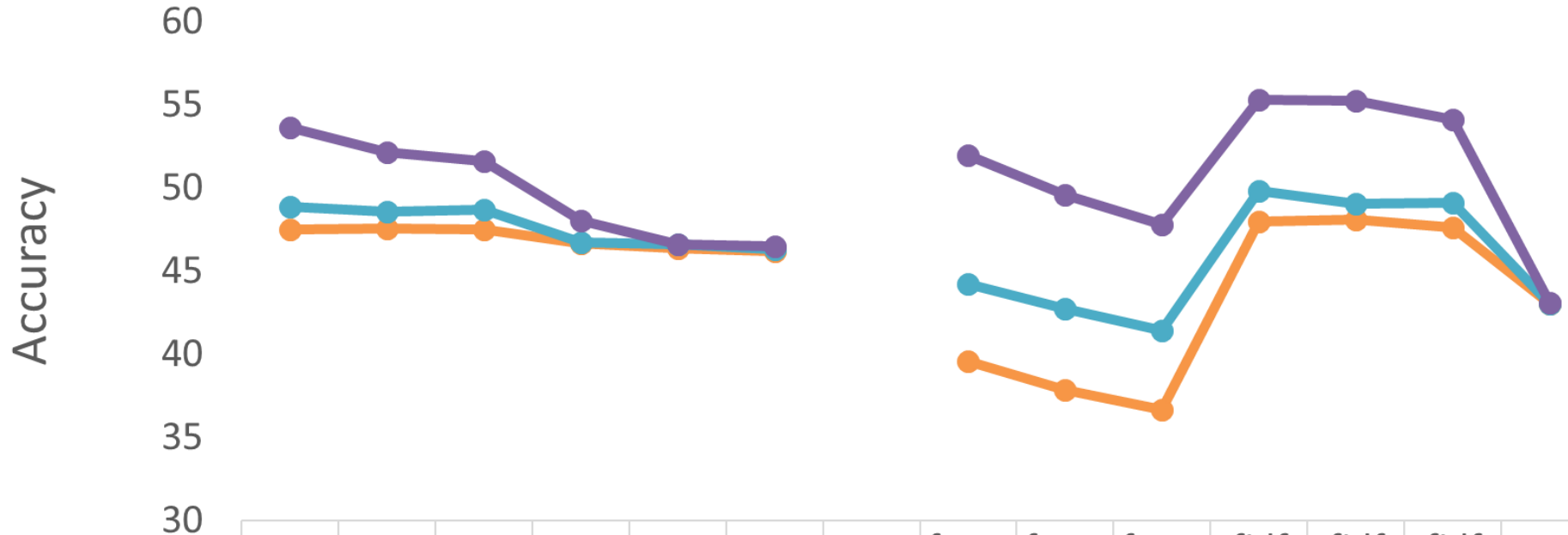
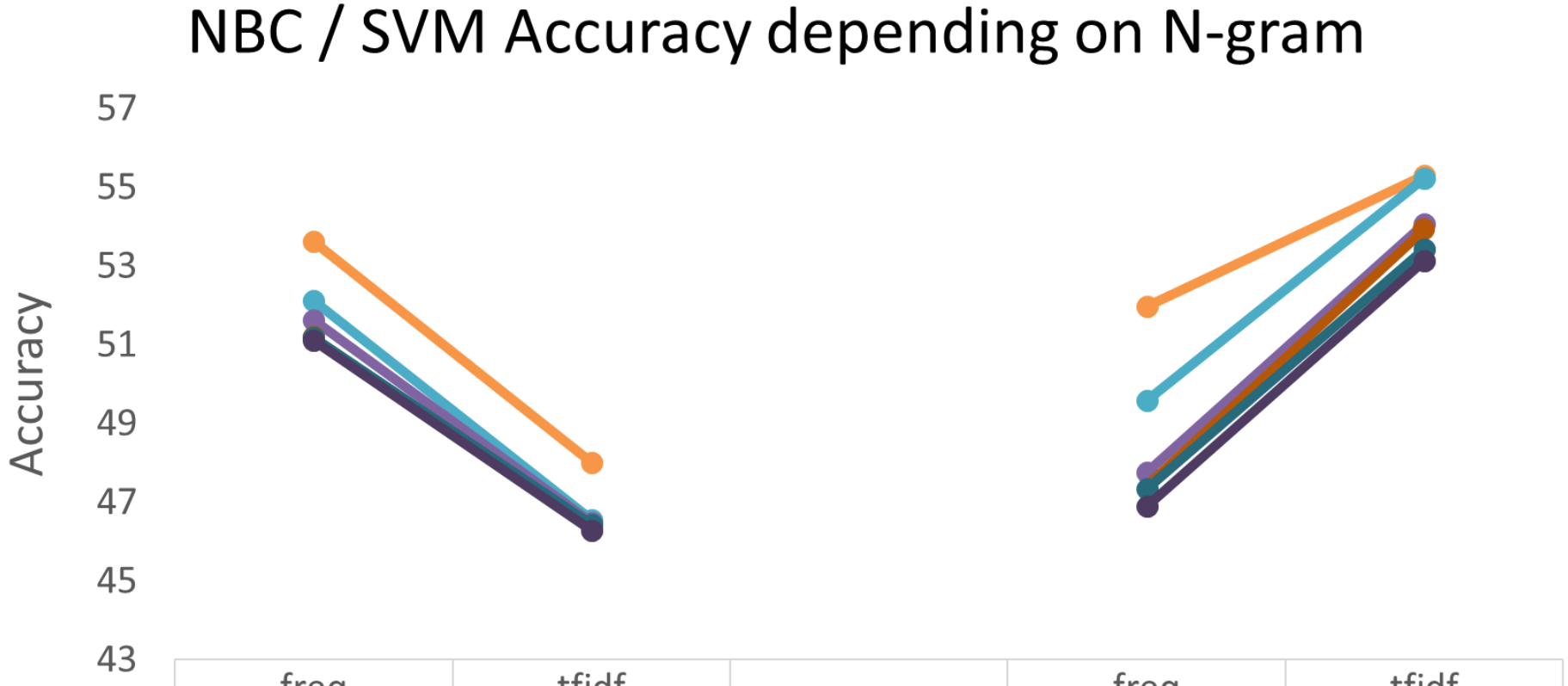
Result

NBC / SVM Accuracy depending on Nouns, Morphs, Consonant



	freq-1	freq-2	freq-3	tfidf-1	tfidf-2	tfidf-3		freq-1-linear	freq-2-linear	freq-3-linear	tfidf-1-linear	tfidf-2-linear	tfidf-3-linear	rbf, poly
Nouns	47.5	47.6	47.5	46.6	46.3	46.2		39.5	37.8	36.7	47.9	48.1	47.6	43
Morphs	48.9	48.6	48.6	46.7	46.6	46.3		44.2	42.7	41.4	49.8	49	49.1	43
Consonant	53.6	52.1	51.6	48	46.6	46.5		52	49.6	47.8	55.3	55.2	54.1	43.1

Result

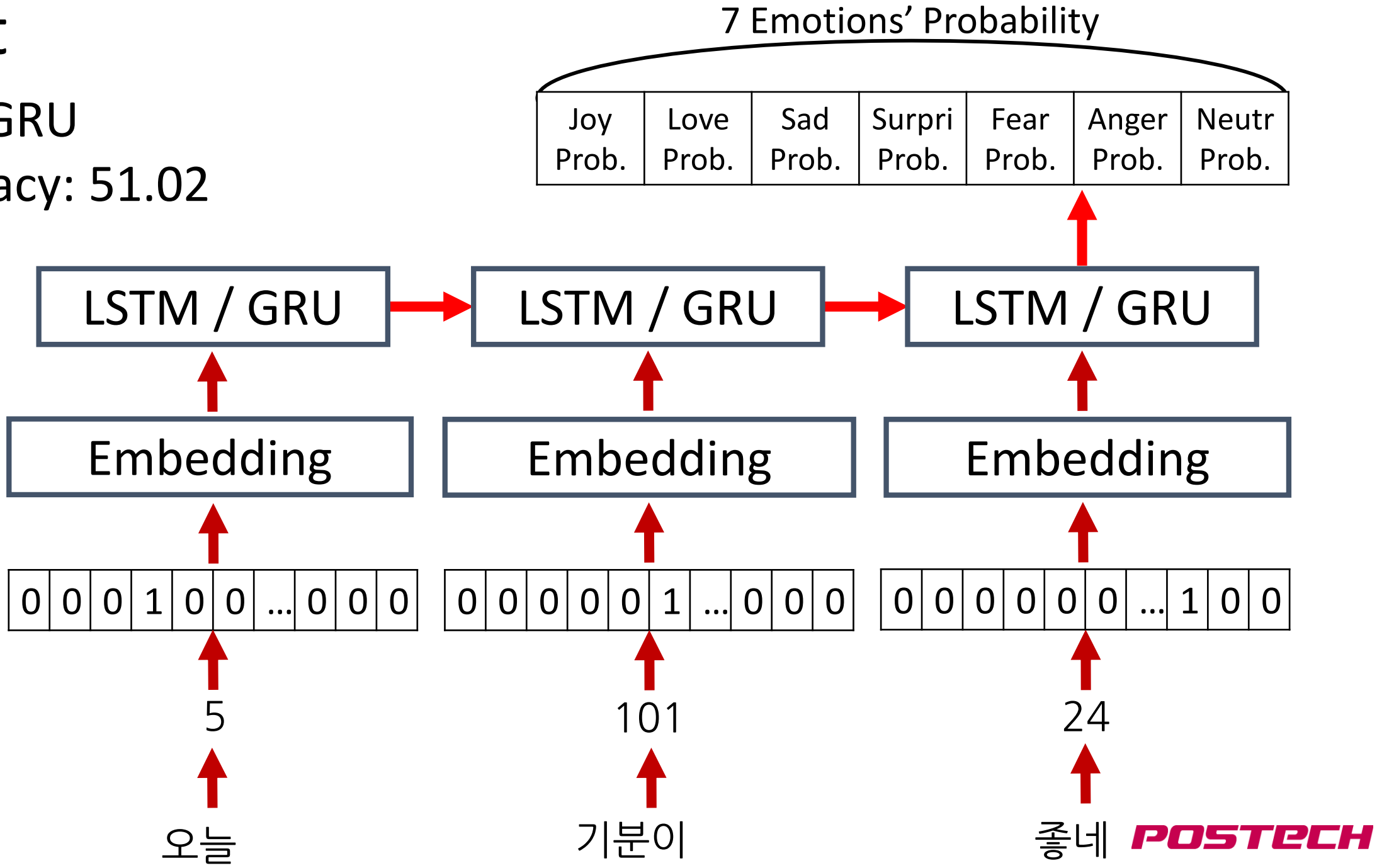


	freq	tfidf		freq	tfidf
1-gram	53.626	48.003		51.96	55.296
2-gram	52.115	46.558		49.572	55.224
3-gram	51.613	46.486		47.765	54.064
4-gram	51.181	46.342		47.406	53.921
5-gram	51.181	46.414		47.334	53.415
6-gram	51.109	46.269		46.899	53.124

Result

RNN-GRU

Accuracy: 51.02



Conclusion and Discussion

In result, 1-gram TFIDF of linear SVM is best performance classifier and second one is RNN classifier. Against expectation, RNN is worse than SVM because of not enough data. Also, 2 or 3 gram classifiers perform worse than 1 gram classifiers. It is because that there exists many meanings in one relation on words, not just one meaning.

Conclusion and Discussion

Because machine learning is based on training a model and predicting by the model, data amount has a strong influence on the accuracy. In this project, when data is increased from 635 to 1,384, accuracy is increased by about 5 % (52.686 %→55.296 %) in 1-gram TFIDF of linear SVM.

Conclusion and Discussion

Classifiers could be improved much more if we distinguish emoticon and punctuation mark to extract textual features.

Source Code

- https://github.com/lshhhhh/EmotionRecognition

References

- Cecilia Ovesdotter Alm, Dan Roth, and Richard Sproat, “Emotions from text: machine learning for text-based emotion prediction”, 2005.
- Chetan R. Chopade, “Text Based Emotion Recognition: A Survey”, International Journal of Science and Research (IJSR), 2013, pp.409-414.
- The Emotion Machine, http://www.theemotionmachine.com/classification-of-emotions.
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