Detecting Customer Complaint Escalation with Recurrent Neural Networks and Manually-Engineered Features

RSVP.ai

Collaborates with:

JD.COM

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Image from:https://www.ratchetandwrench.com/articles/5045-dealing-with-customer-complaints

Who are we?

RSVP.ai

RSVP.ai is a Canadian startup based in Waterloo, Ontario that aims to build deep natural language understanding systems to facilitate seamless dialogues between humans and machines.

JD.COM

One of the largest Chinese e-commerce company. As of the first quarter of 2018, its platform has 301.8 million active users.

The same problem has happened on many orders. I want to protect my rights as a consumer!!!

Hi, can you please provide me with the order number? I'll look into this for you!

Hi, Agent ID 1234 from JD.com, happy to assist you!

I've told you the address SEVERAL TIMES already!!! But you've wasted my time by making me go back to the original address.

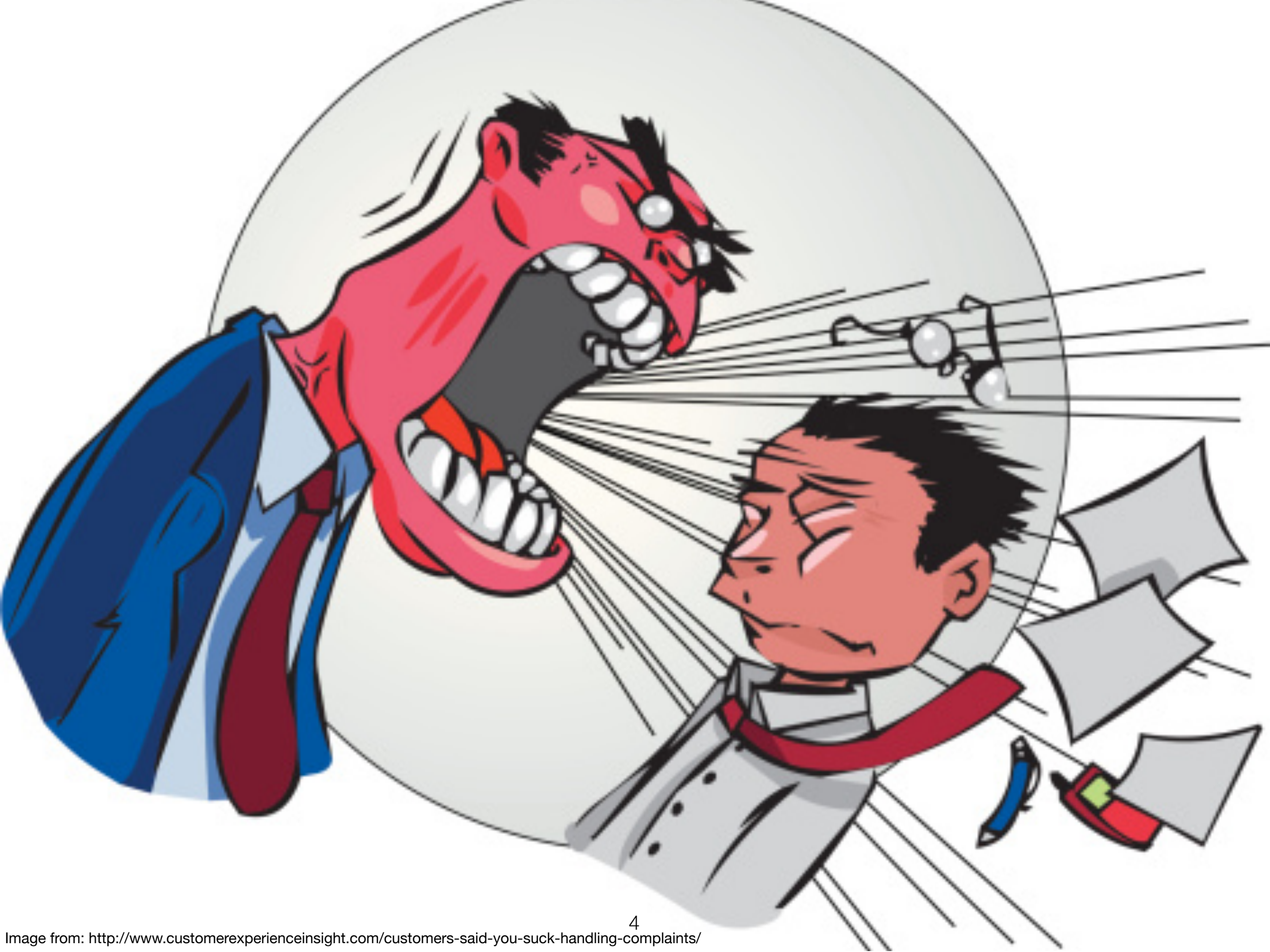
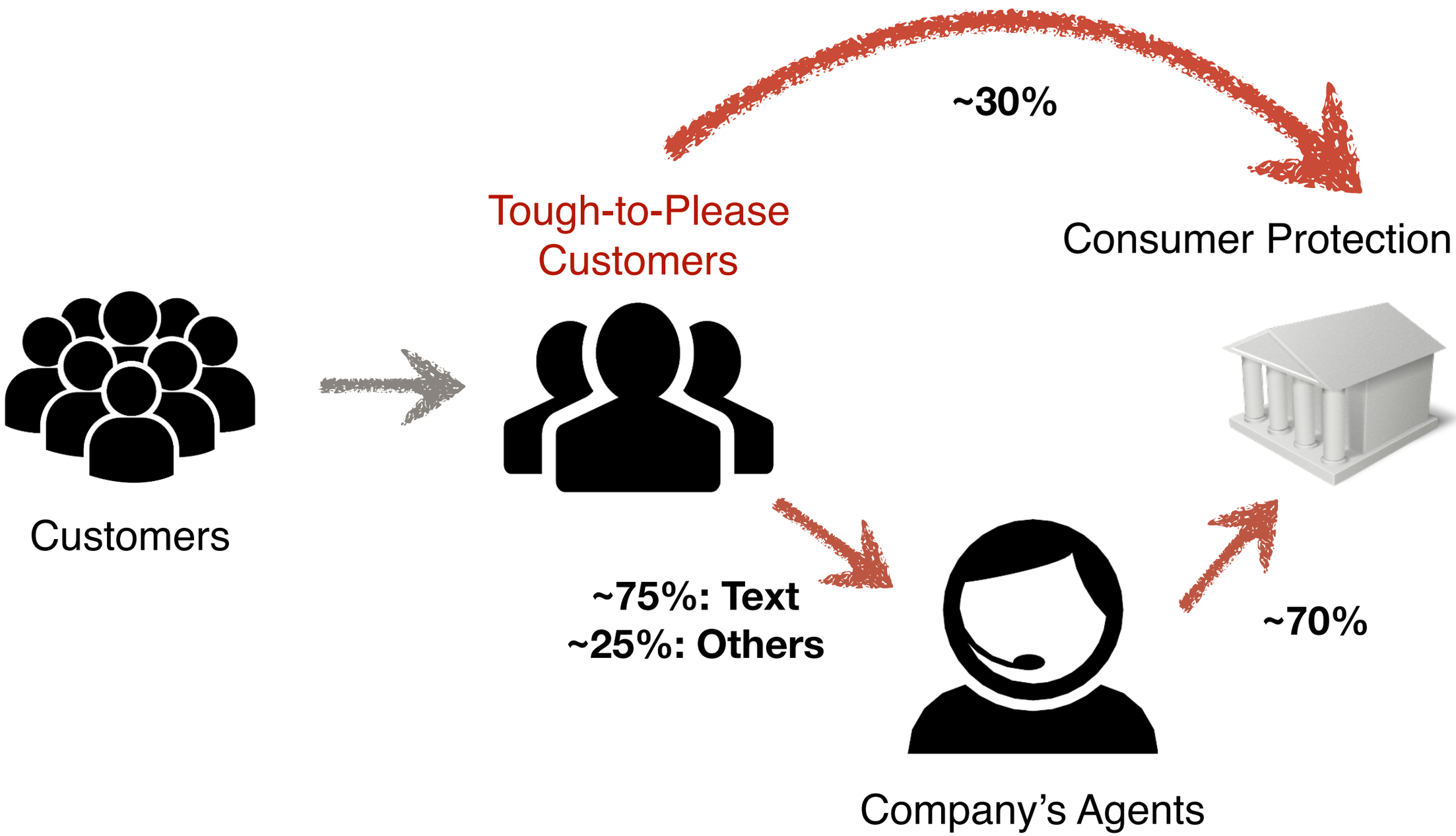


Image from: http://www.customerexperienceinsight.com/customers-said-you-suck-handling-complaints/

Customer Complaint Escalation



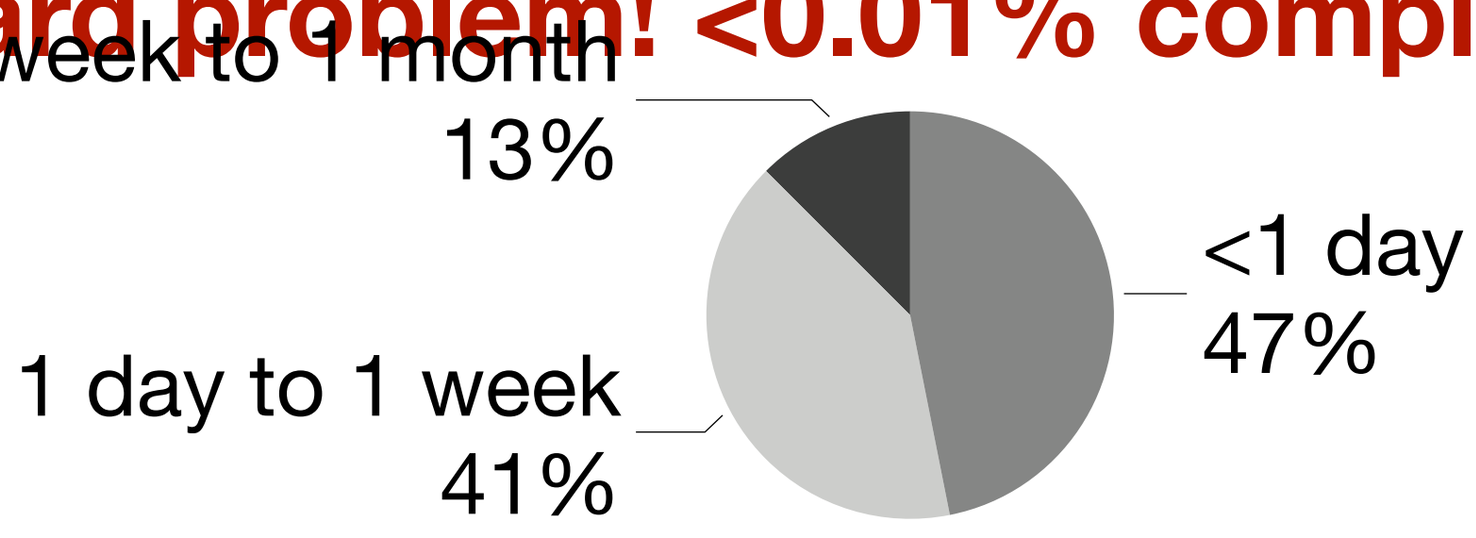
Detecting Customer Complaint Escalation

- 300+ complaints every day!
- Bad customer service experience causes serious brand damage to JD.com.
- Importance of real time detection system

Online classification problem over dialogue

How long does it takes for the customer complaints after they talk to the agents?

Hard problem! <0.01% complaints!



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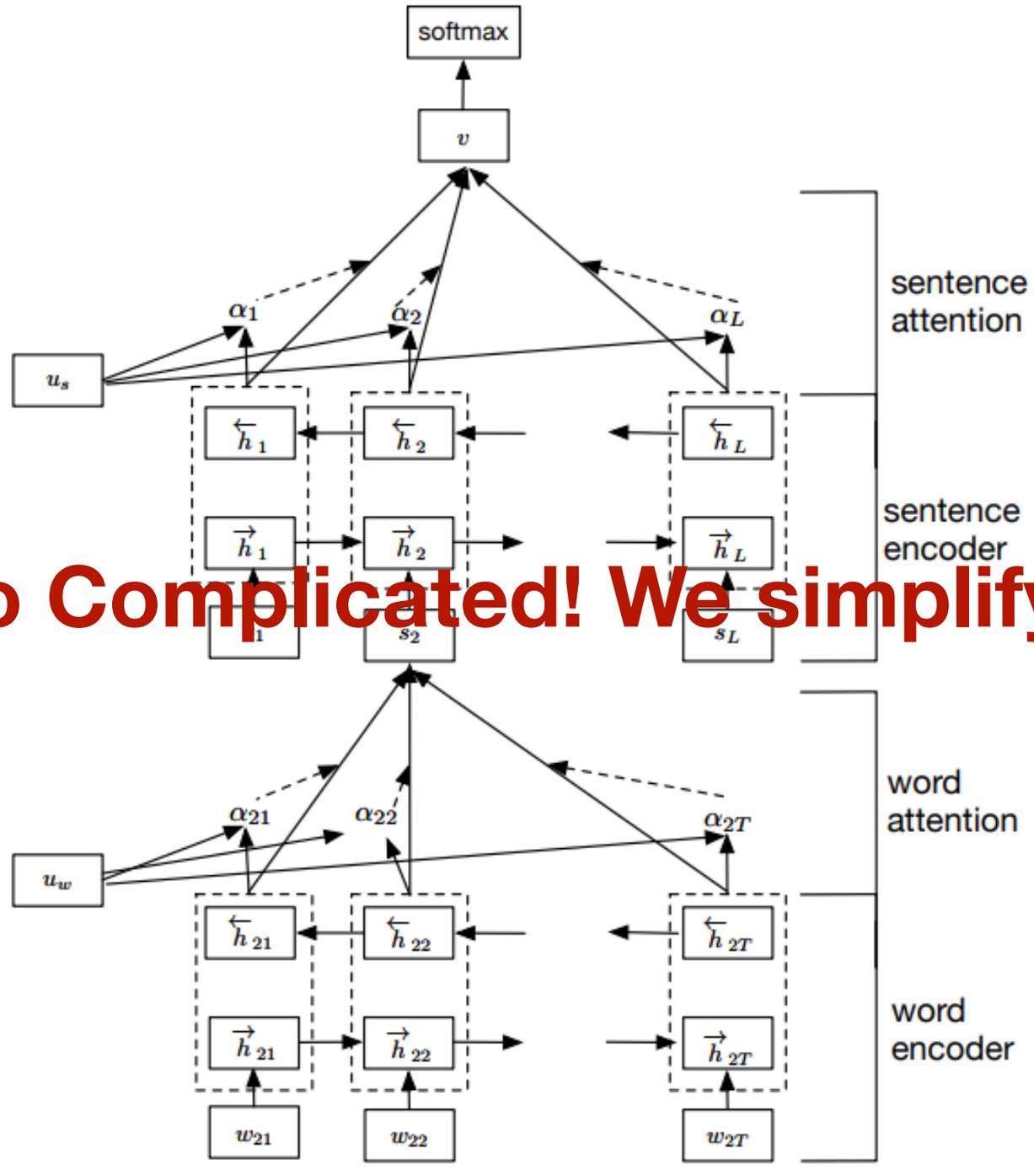
Model

Tf-idf vectors

Neural Network!

Manually-engineered features

Hierarchical Attention Network

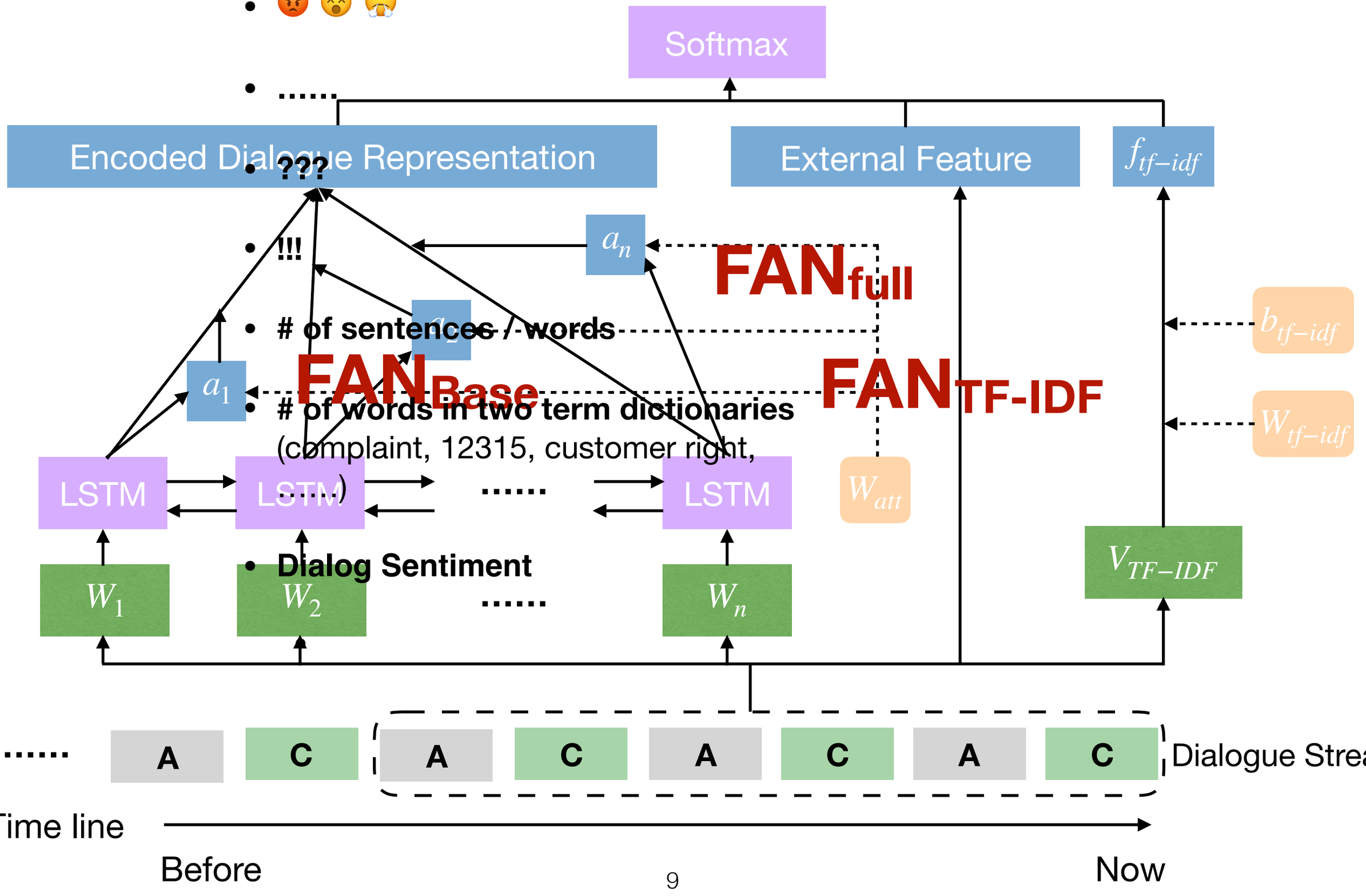


Too Complicated! We simplify!

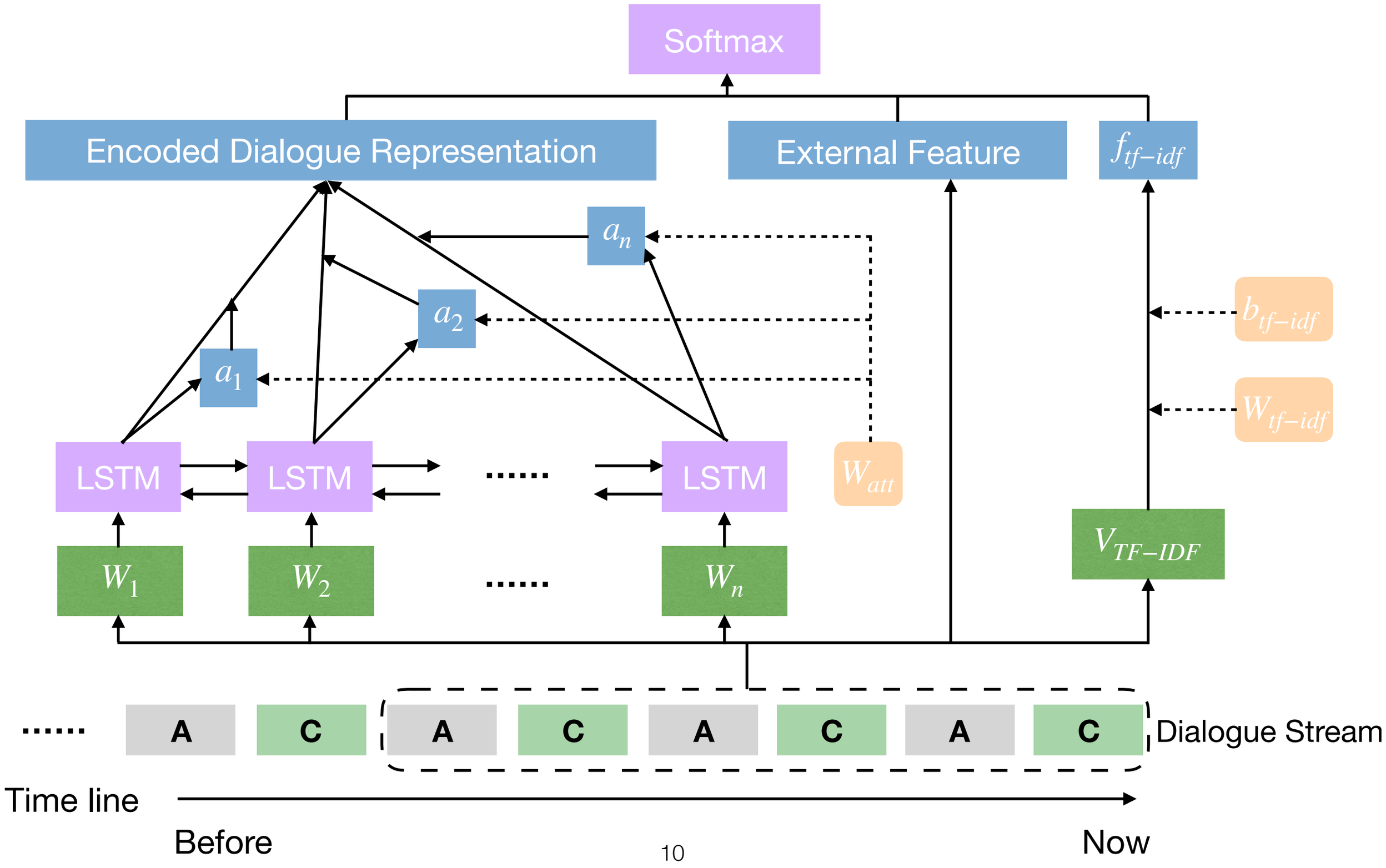
Yang et al. 2016. Hierarchical attention networks for document classification. (NAACL 2016)

Model Framework

- 😡 😵 😤
- .....
- ???
- !!!
- # of sentences / words
- # of words in two term dictionaries (complaint, 12315, customer right, ...)
- Dialog Sentiment



Model Framework



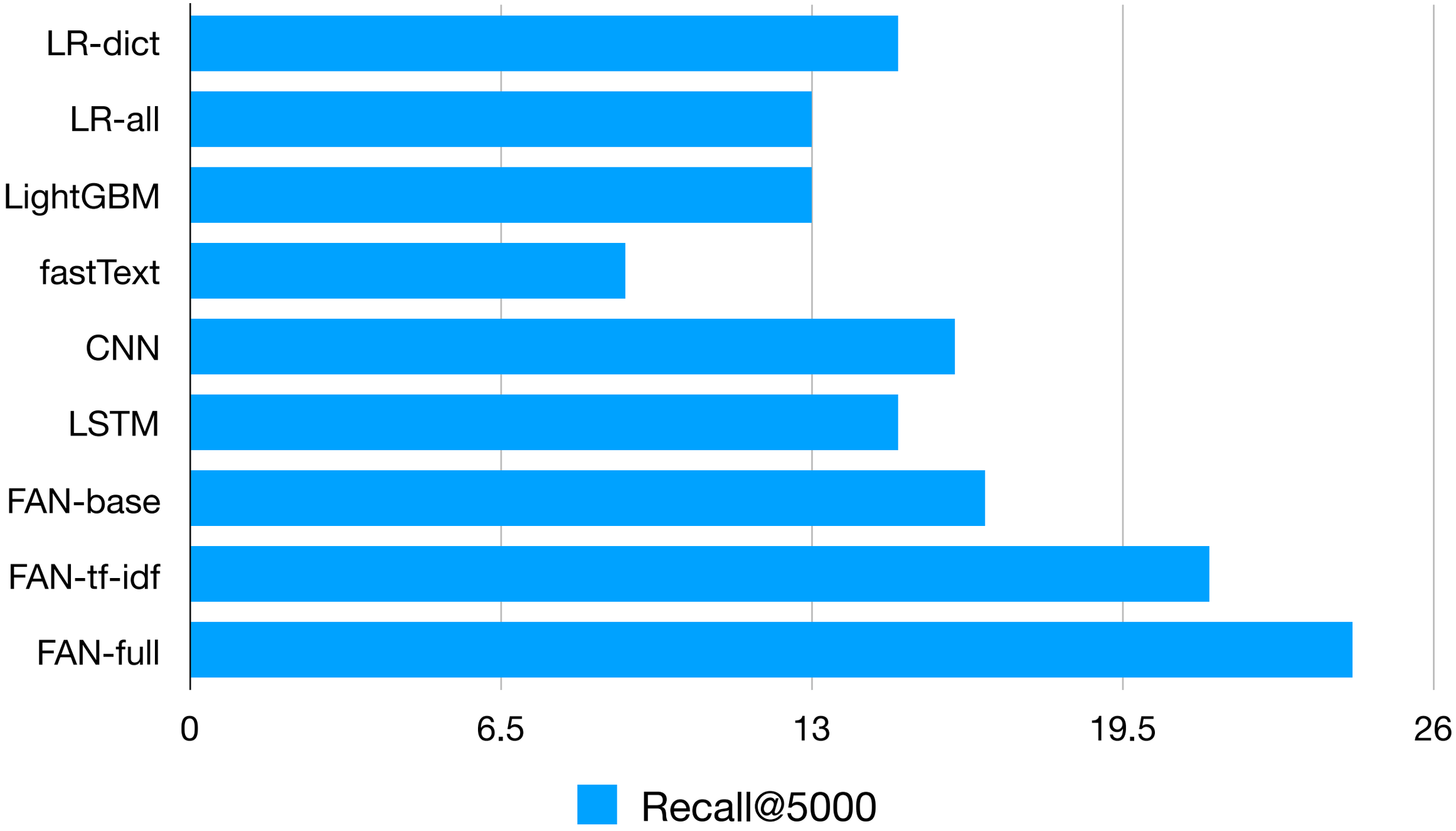
Evaluation Metrics

$$Recall@K = \frac{\#\ of\ Detected\ Complainted\ Customers\ in\ Top\ K}{\#\ of\ Customer\ Complaints}$$

Experimental Setup

- Comparison with Baselines
- Effect of Negative Samples
- Results over An Entire Week
- Online Deployment Results

Comparison with Baselines



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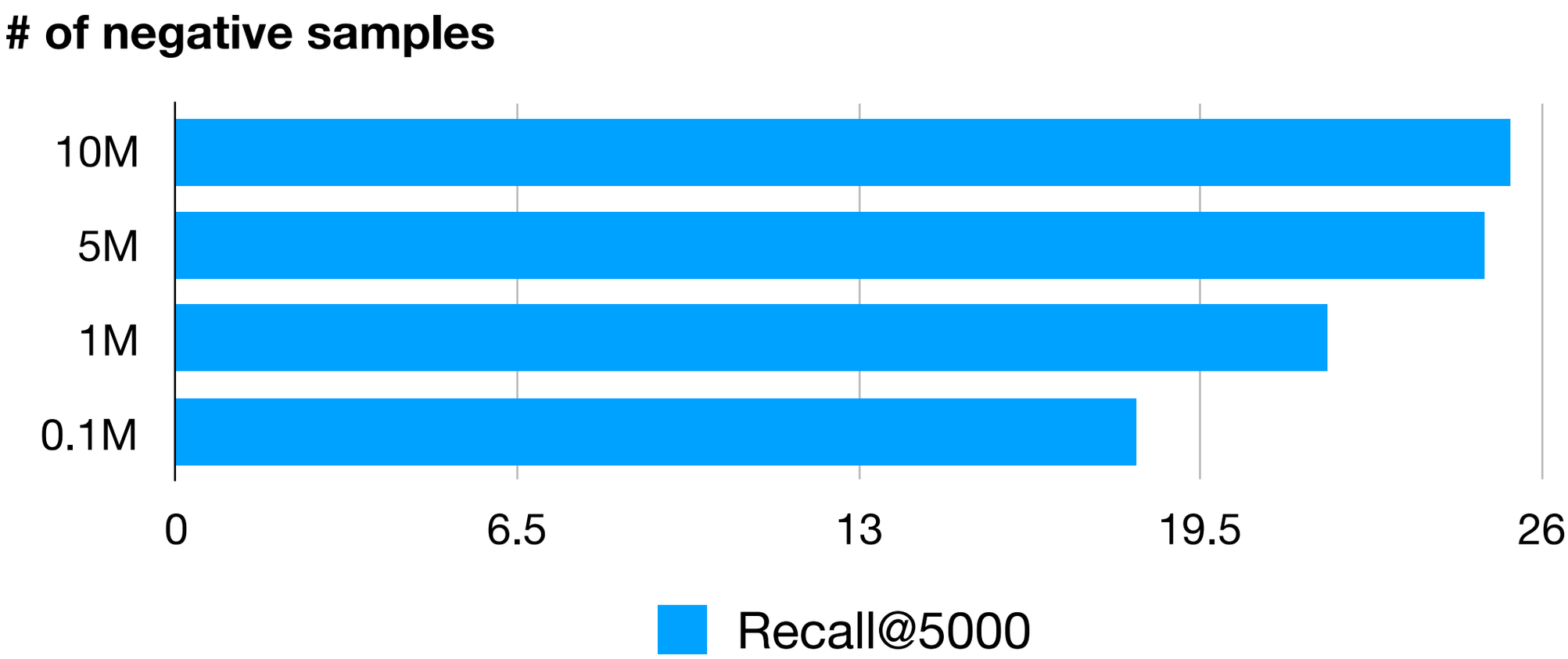
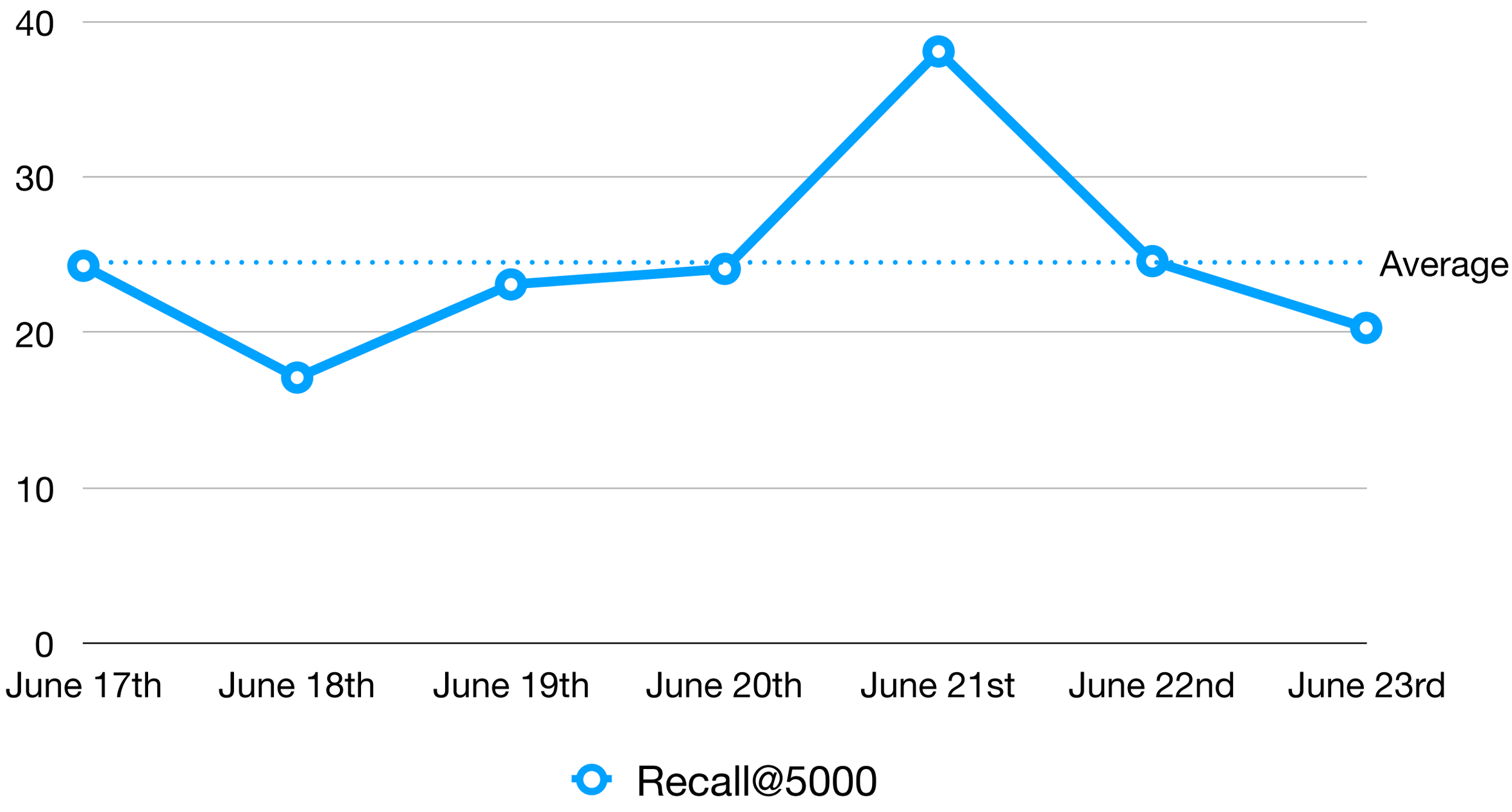
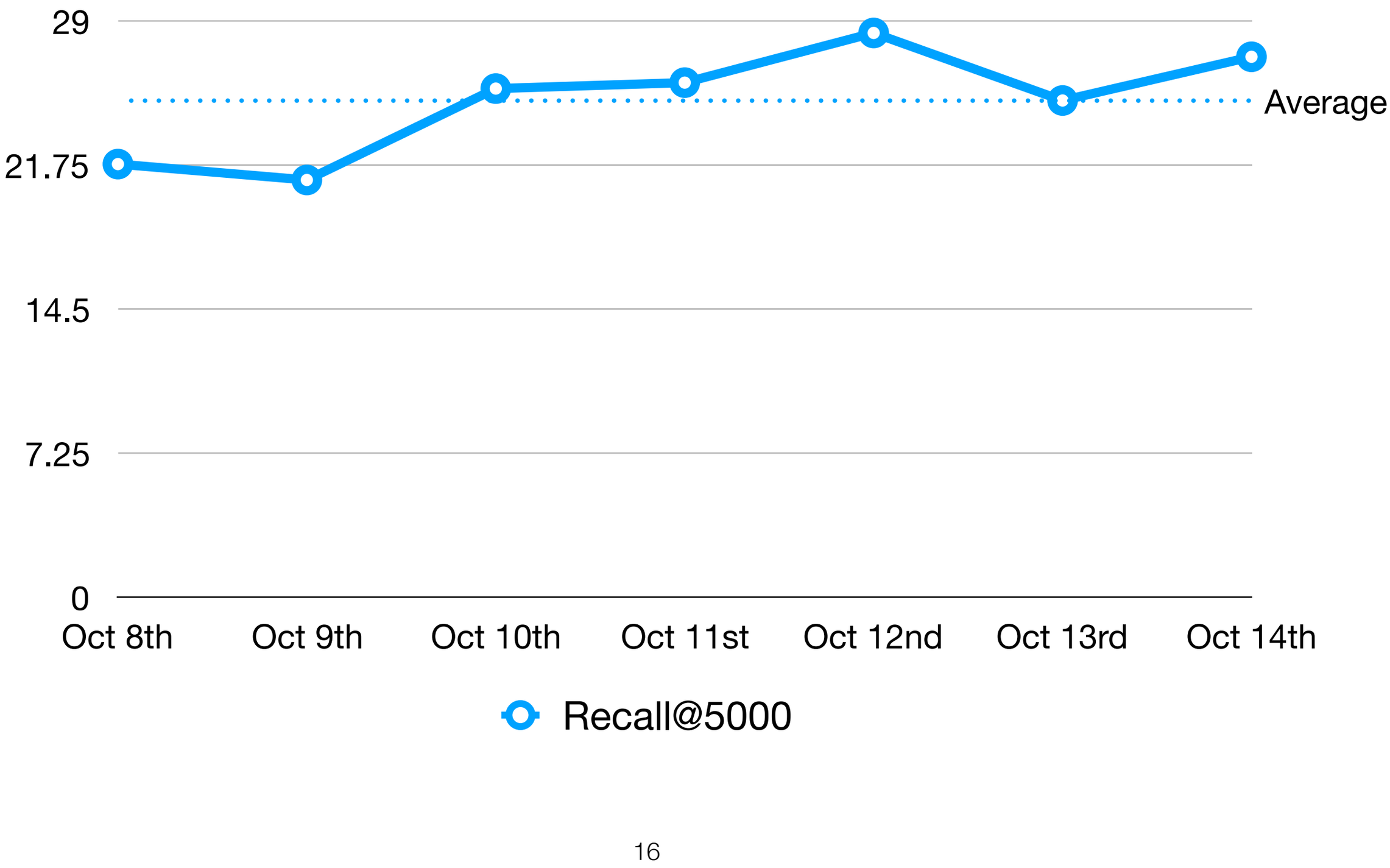
Effect of Negative Samples



Results over An Entire Week



Online Deployment Results



Lesson Learned

- **Start with simple models.**
- **Don’t start over.** Always reuse existing solutions.
- If NN cannot provide enough capacity, try **manually-engineered features**!

Q & A

Thank you!