W207– Applied Machine Learning

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Sequence modelling and Embeddings

Last week

- Baseline presentation (I will send feedback by EOD on Friday)
- Clustering analysis and PCA

Today’s learning objectives

- Sequential modeling and Embeddings
- Application: Sentiment analysis based on drug reviews data

Sequential modeling

Typical ML algorithm

e.g., Linear model, Logistic reg, Decision tree

- input is independent
- the order in which the training examples are given to the model is irrelevant

Sequential ML algorithm

e.g., RNN/LSTM, Transformers

- input is not independent (order matters)
- E.g., if your task is to predict diagnosis in the next hospital visit, then it would make sense to consider previous medical history in a date-sorted manner.

Sequential modeling

Can choose between different architectures depending on input data and output of interest

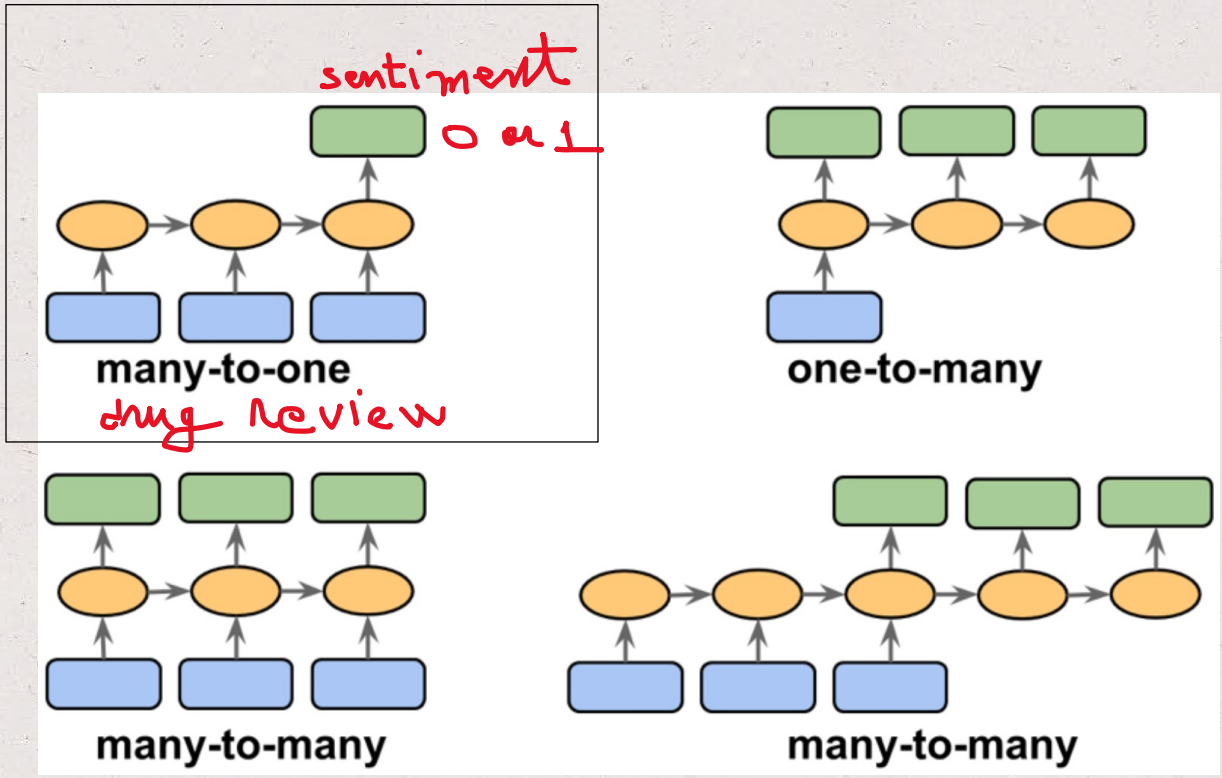
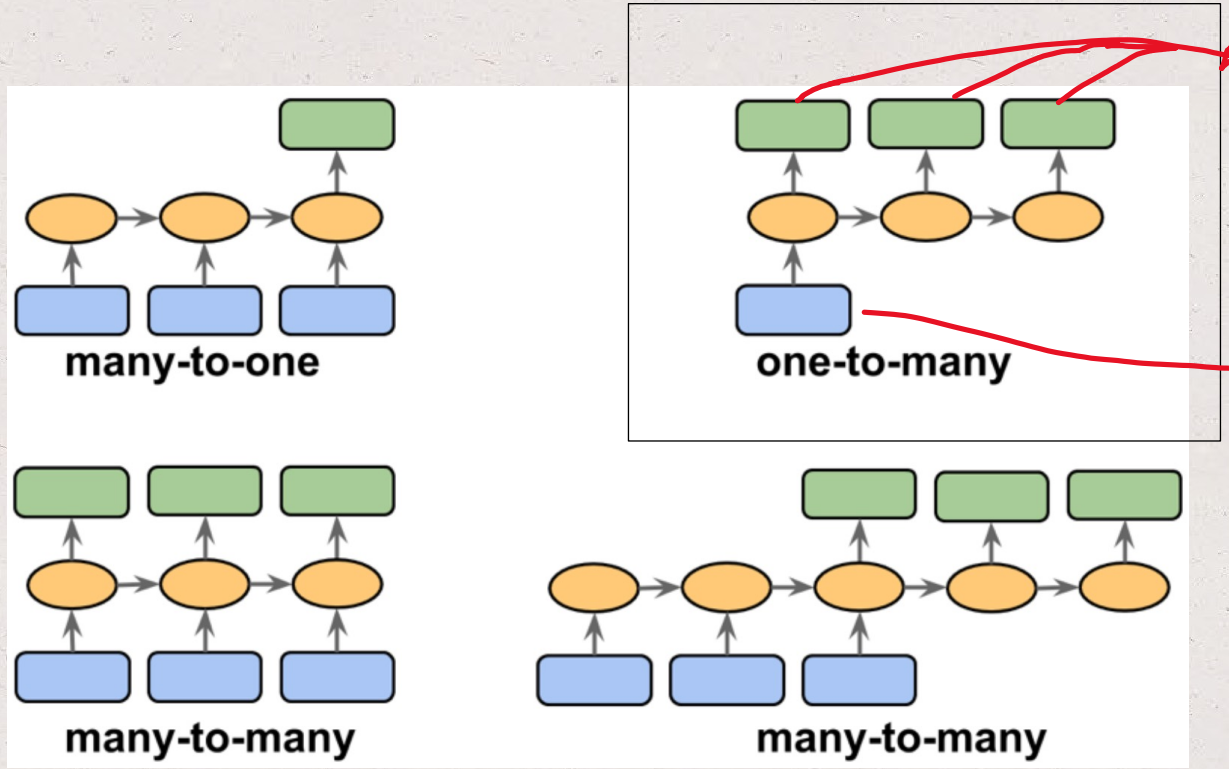


Image source: https://github.com/rasbt/python-machine-learning-book-3rd-edition/blob/master/ch16/ch16_part1.ipynb

Sequential modeling

Can choose between different architectures depending on input data and output of interest

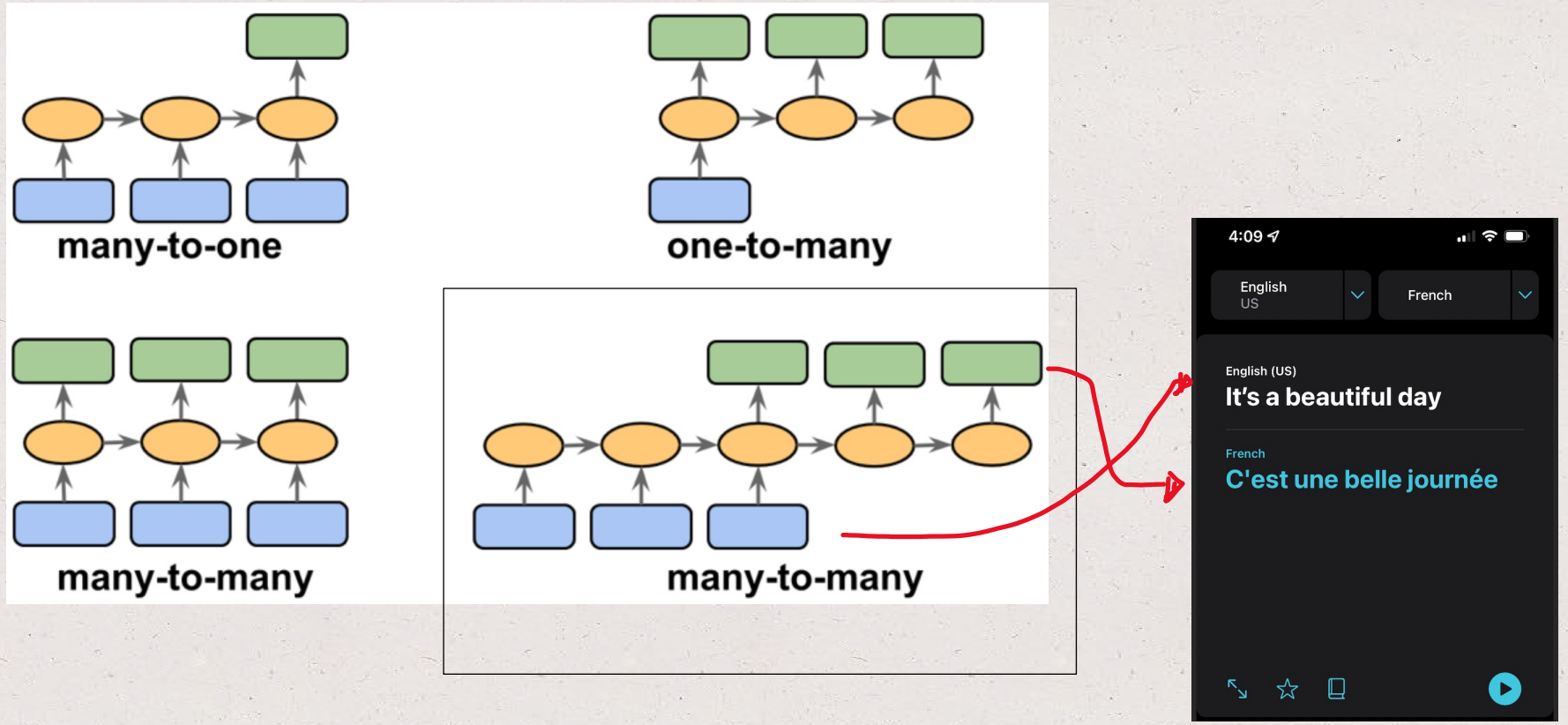


A brown bear standing on top of a lush green field.

Input is not a sequence but output is!

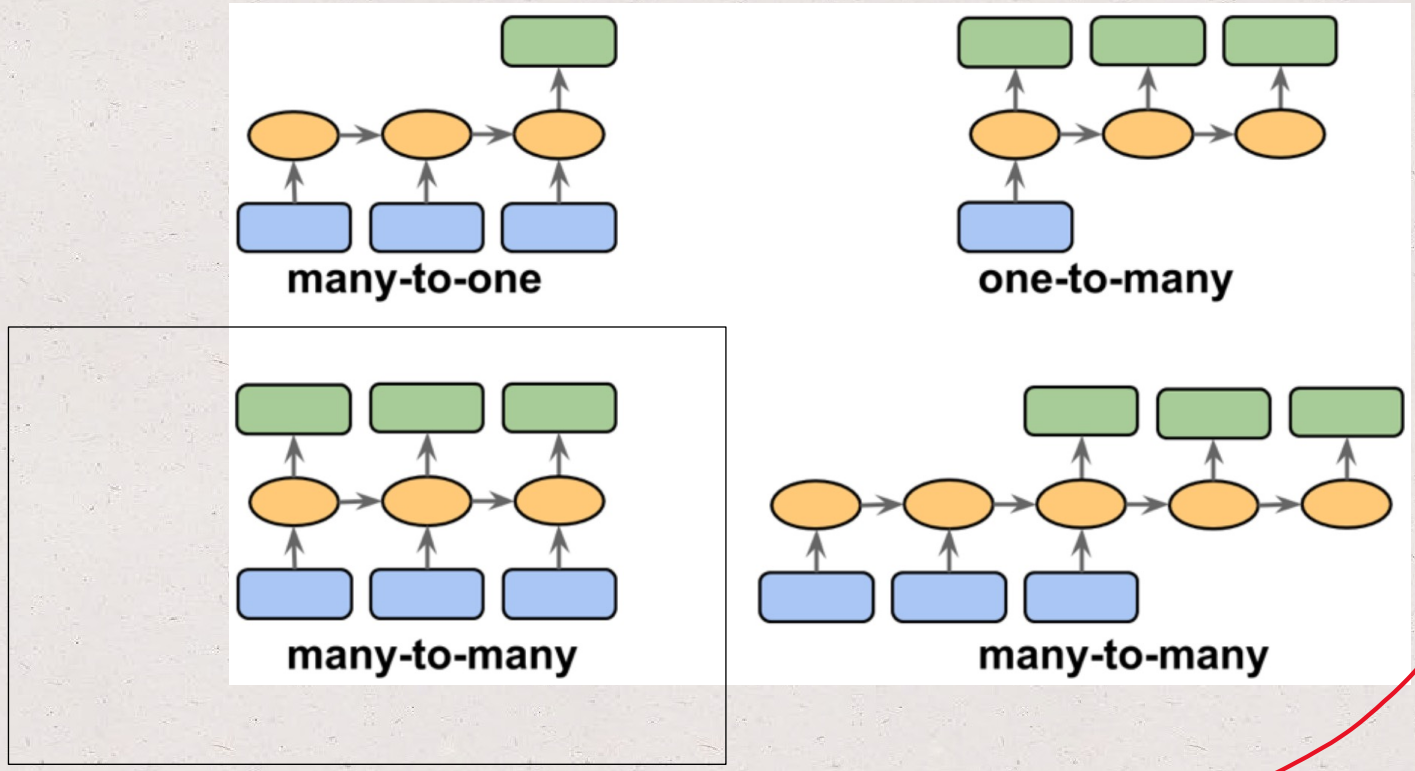
Sequential modeling

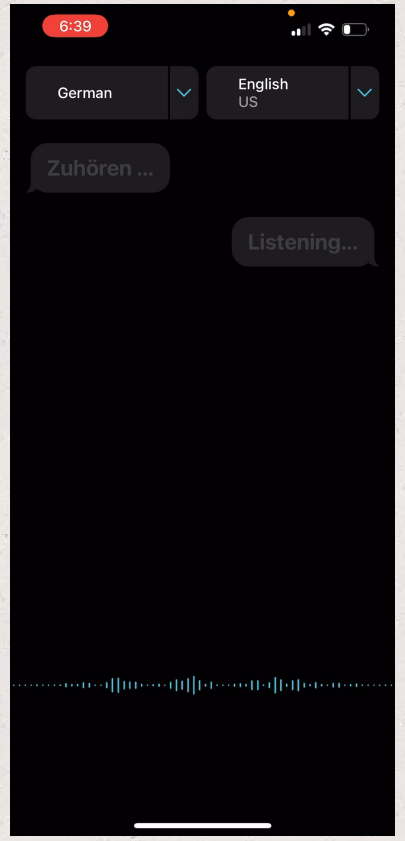
Can choose between different architectures depending on input data and output of interest



Sequential modeling

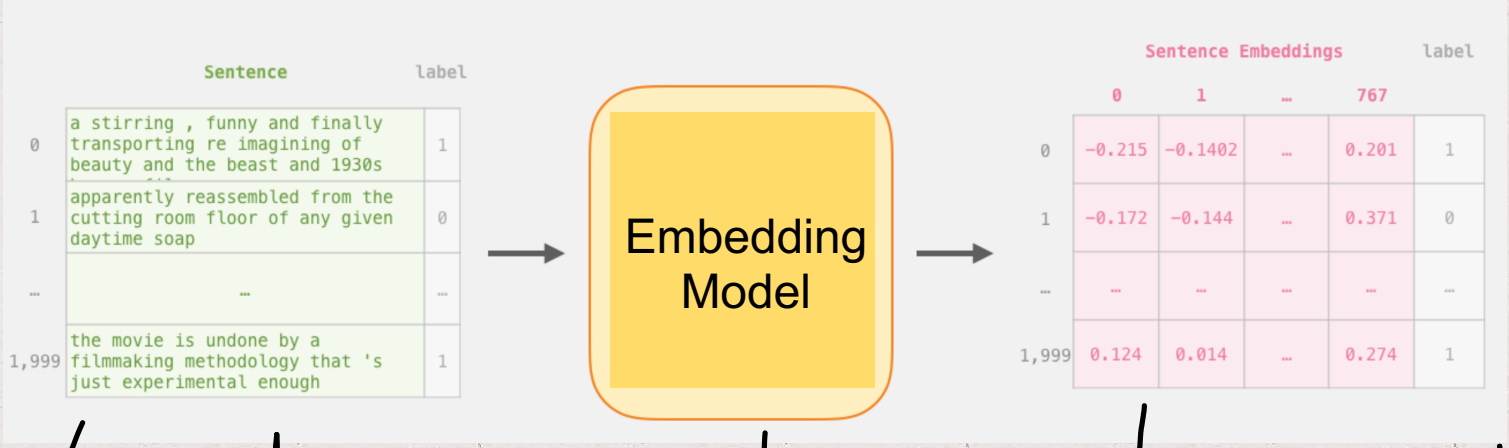
Can choose between different architectures depending on input data and output of interest





Translation updates as you speak

Embeddings



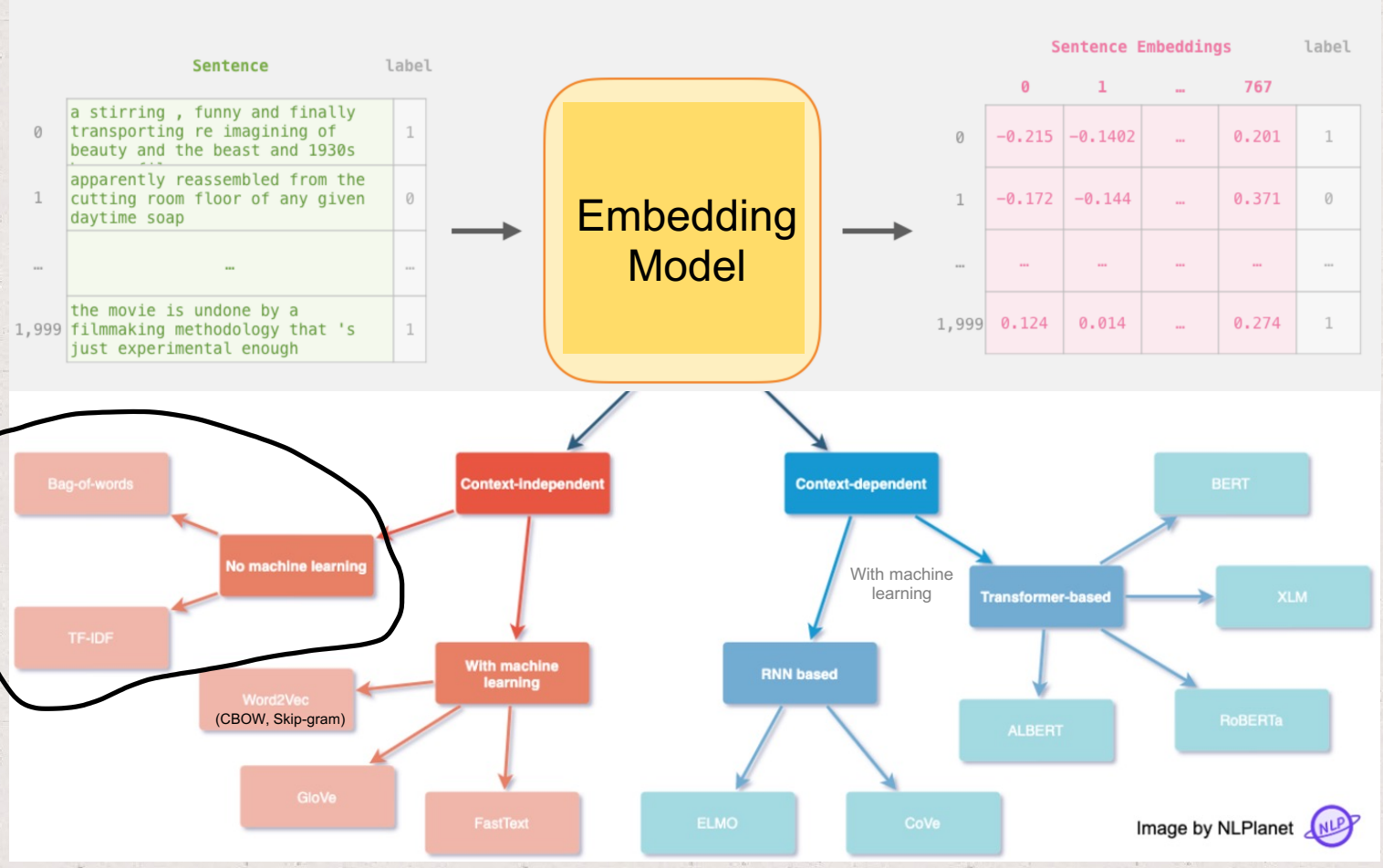
↳ input (sequential)

↓ lots of options

↳ output (features)

Inspiration source: https://colab.research.google.com/github/jalammar/jalammar.github.io/blob/master/notebooks/bert/A_Visual_Notebook_to_Using_BERT_for_the_First_Time.ipynb

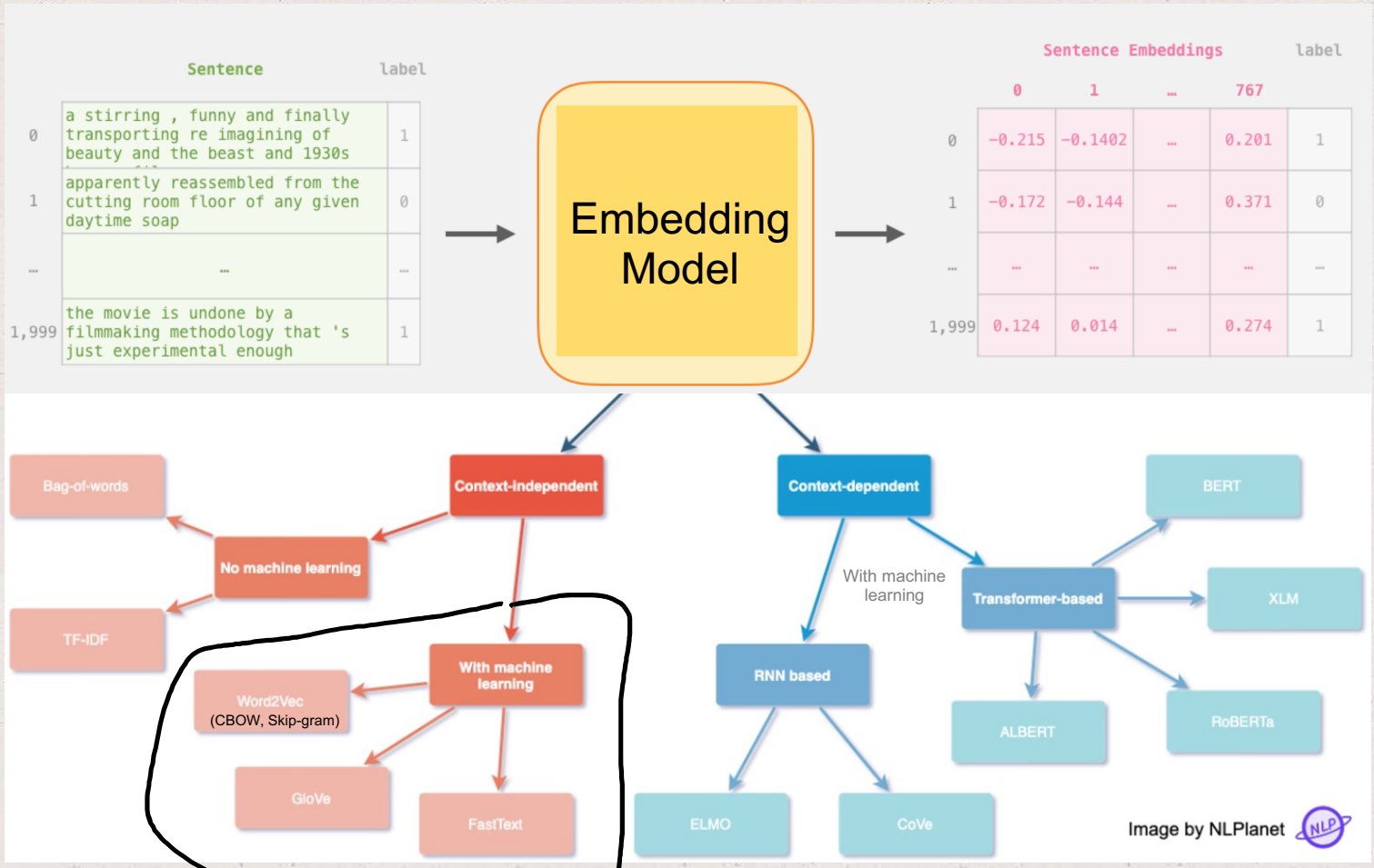
Embeddings



Nothing to learn (human input)
(RM, Ch 8)

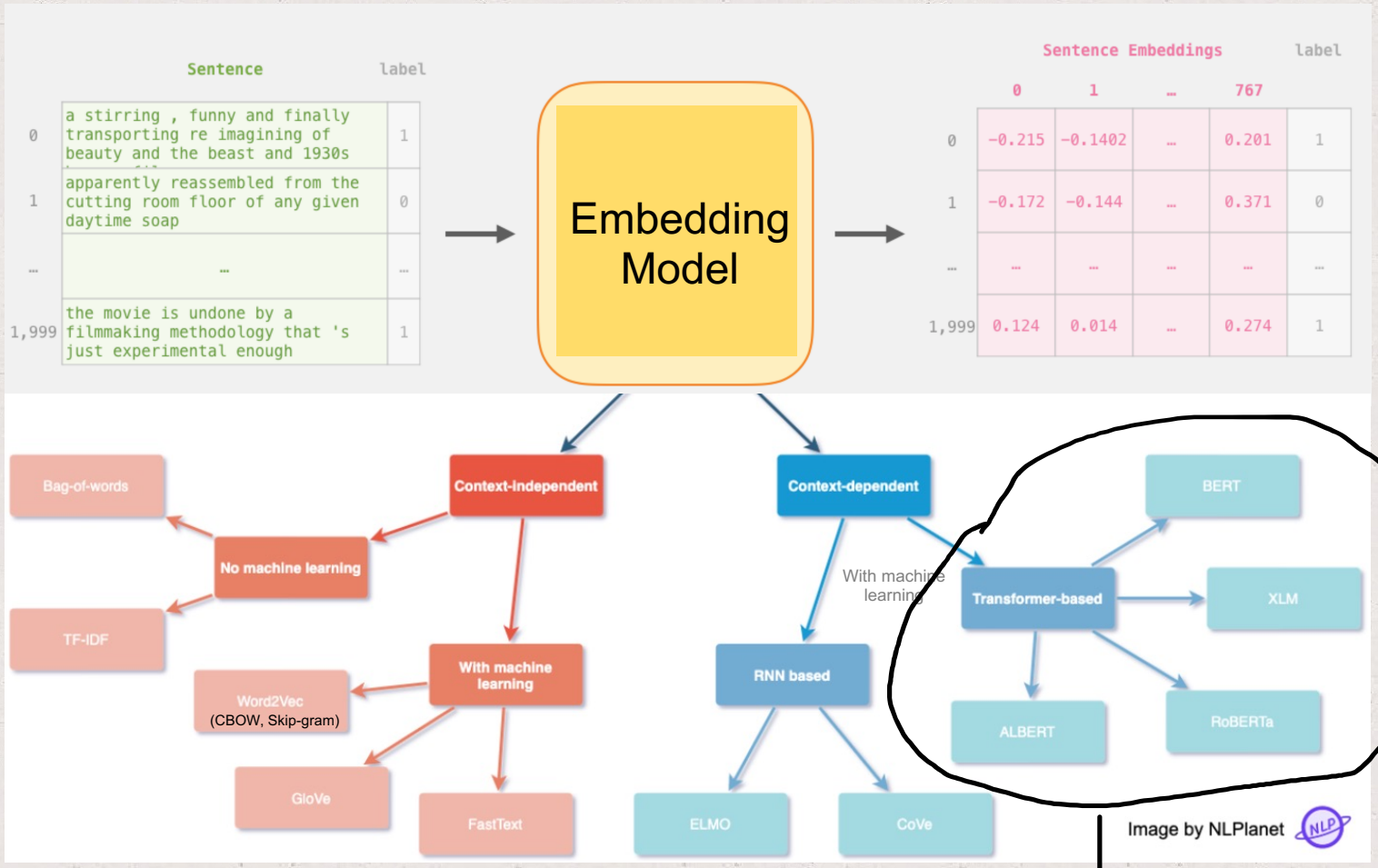
Image source: https://medium.com/nlplanet/two-minutes-nlp-11-word-embeddings-models-you-should-know-a0581763b9a9

Embeddings



↳ Not so popular anymore. Why?

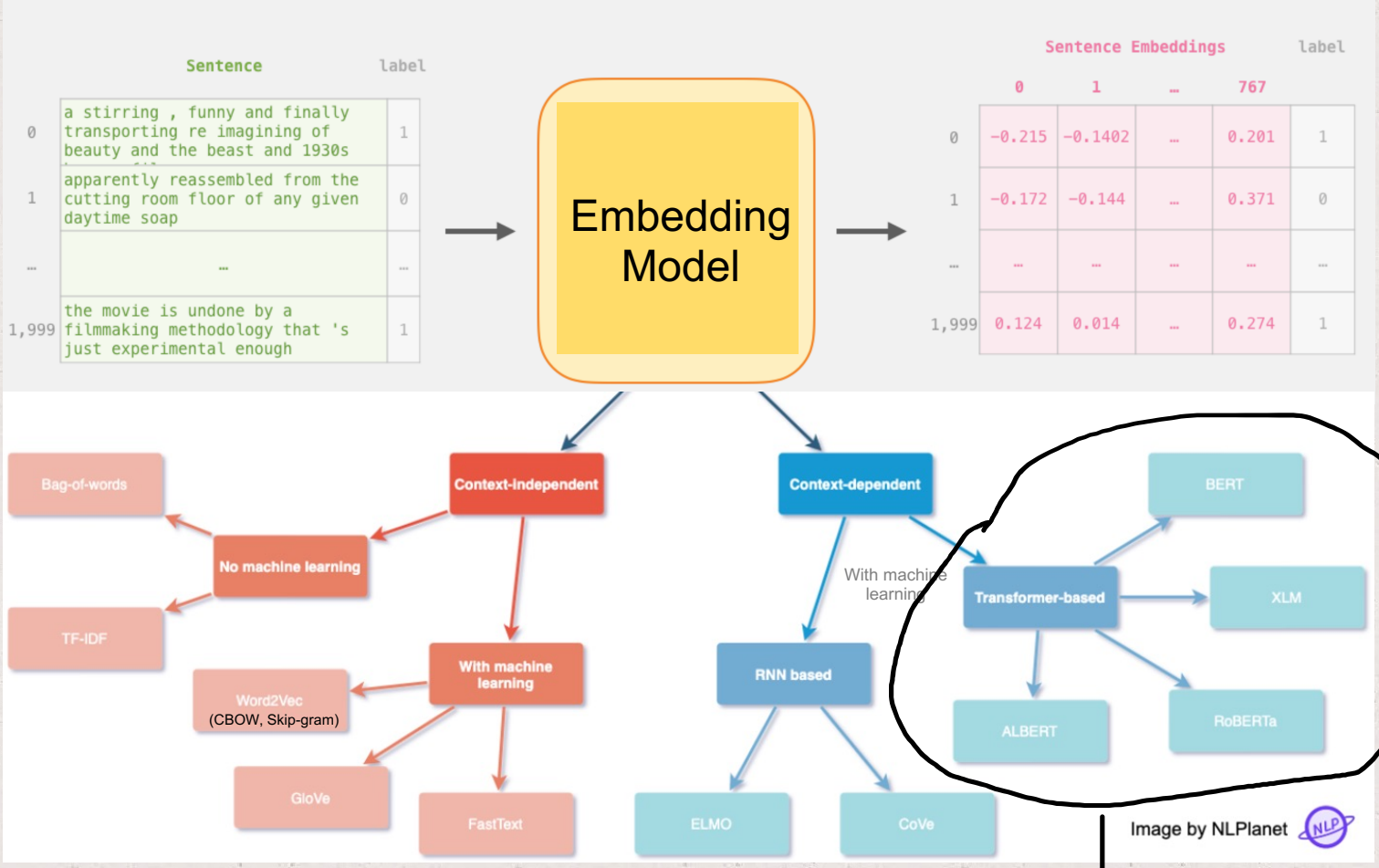
Embeddings



Transformers changed the game!

Week 13 material

Embeddings



What embedding model is used for our drug sentiment classification task this week?

Transformers changed the game!

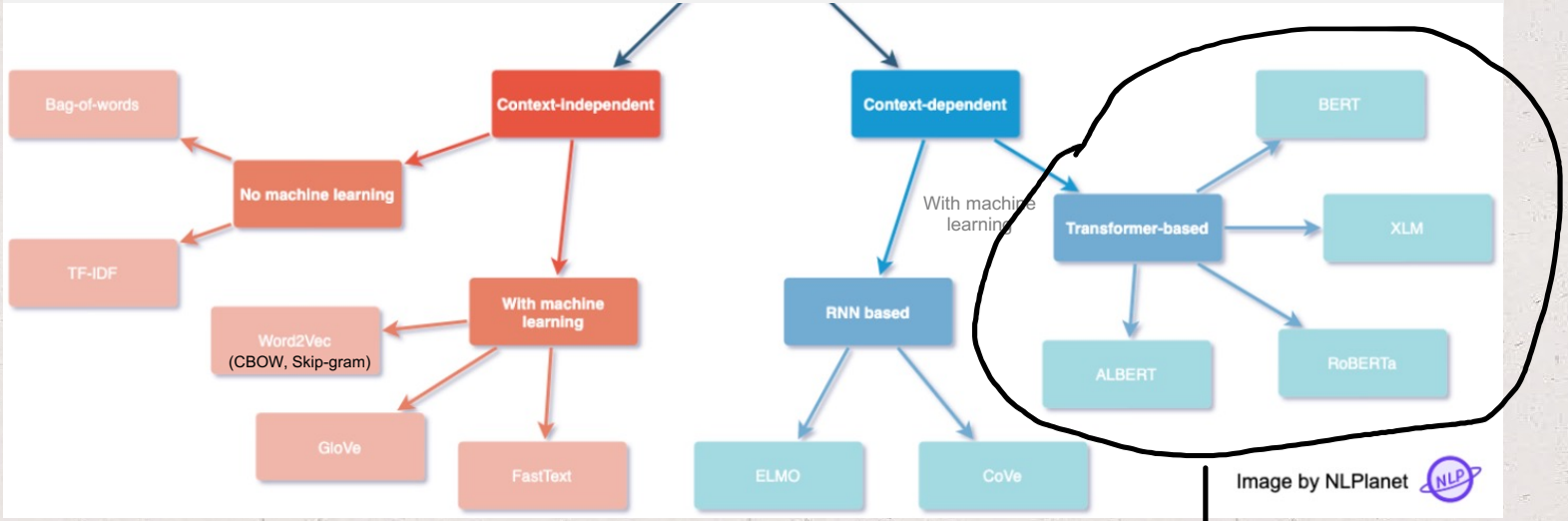
Week 13 material

Embeddings

	Sentence	label
0	a stirring , funny and finally transporting re imagining of beauty and the beast and 1930s	1
1	apparently reassembled from the cutting room floor of any given daytime soap	0
…	…	…
1,999	the movie is undone by a filmmaking methodology that 's just experimental enough	1

Embedding Model

	Sentence Embeddings		…		label
	0	1	…	767	
0	-0.215	-0.1402	…	0.201	1
1	-0.172	-0.144	…	0.371	0
…	…	…	…	…	…
1,999	0.124	0.014	…	0.274	1



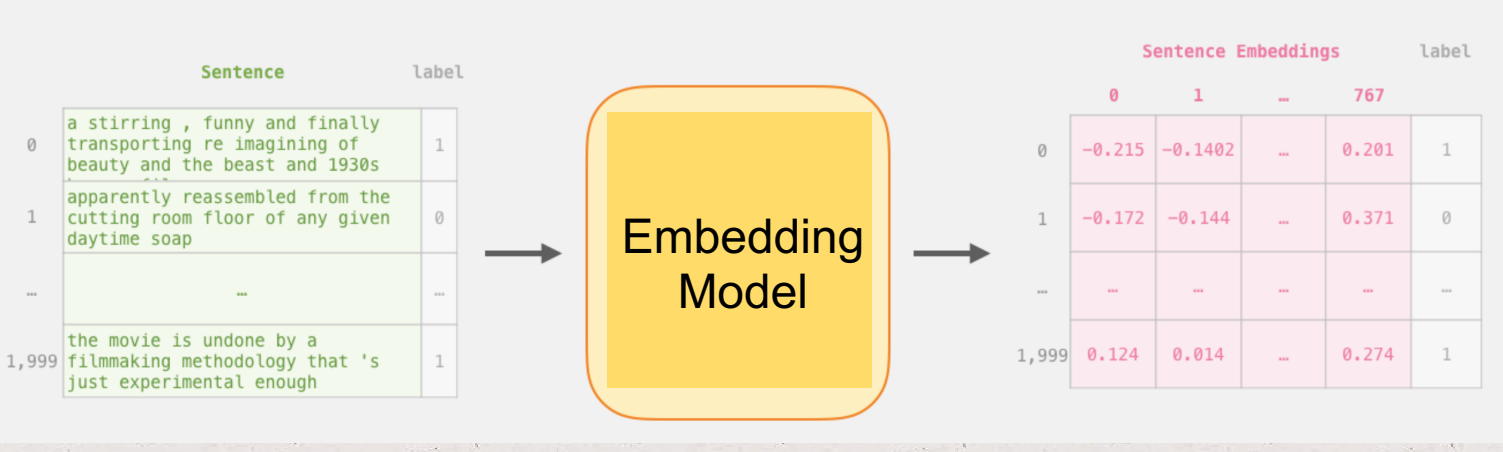
What embedding model is used for our drug sentiment classification task this week?

we define our own FNN model!

Transformers changed the game!

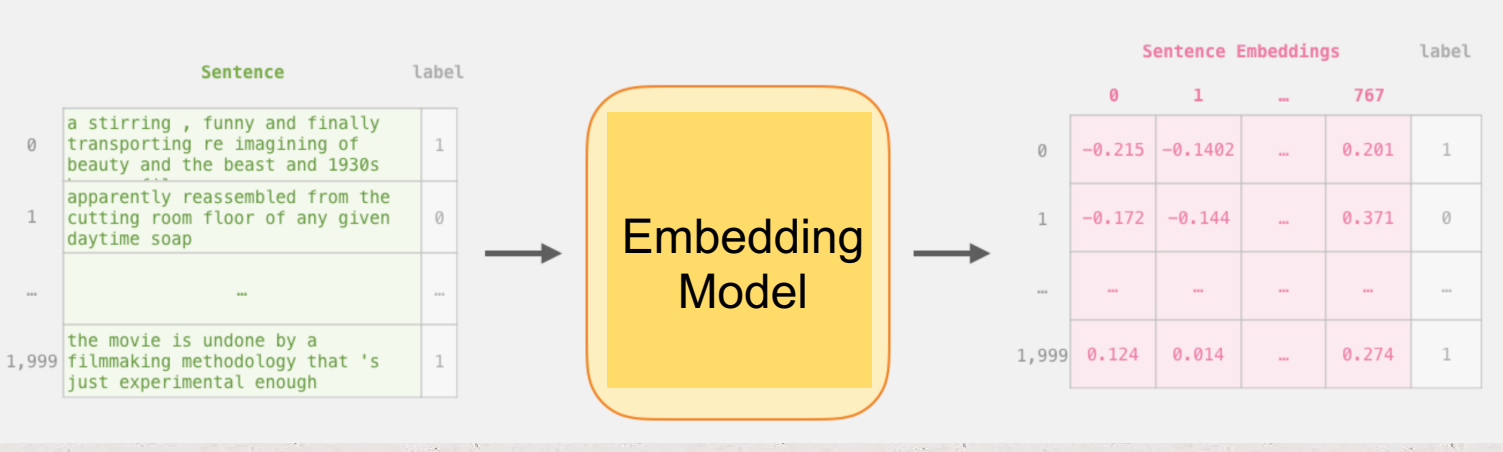
Week 13 material

Embeddings



What's next?

Embeddings



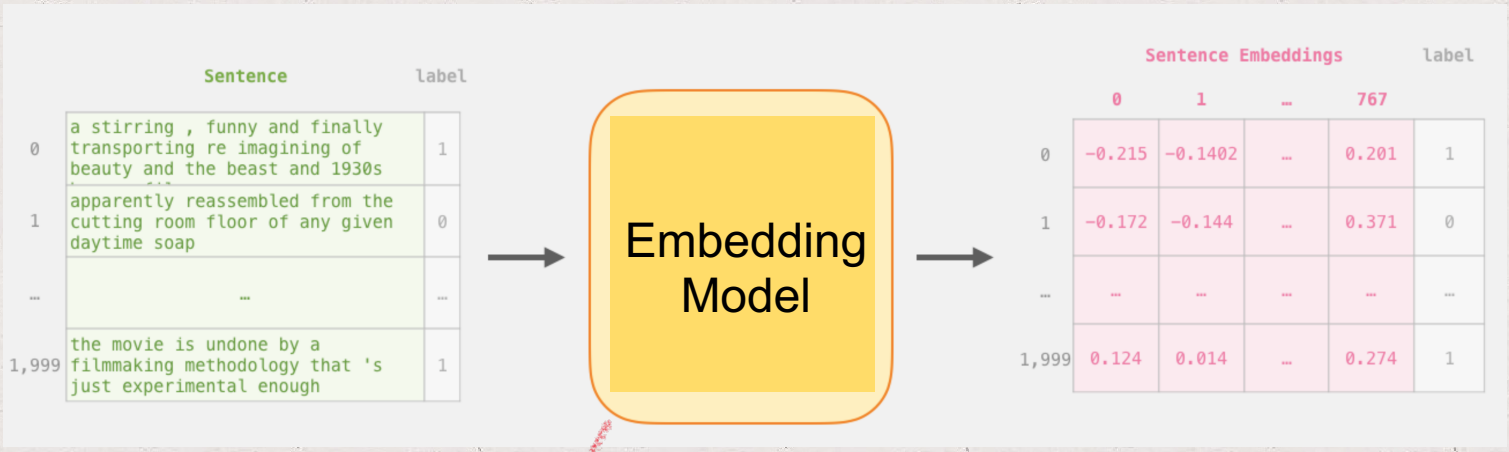
Provide these features to downstream tasks, e.g., sentiment classification

Logistic Regression

class prediction

positive

Embeddings



Provide these features to downstream tasks, e.g., sentiment classification

The good news: transfer-learning!

(1) Transfer the learned embeddings (model trained on a large corpus of data., e.g., BERT)

(2) Fine-tune model on a downstream tasks (e.g., sentiment classification)

Logistic Regression

class prediction

positive