



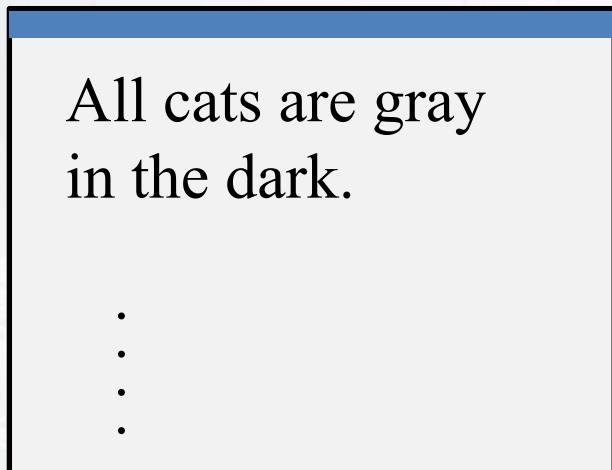
# Brief overview of the next weeks

# Week 1

Text  $\rightarrow$  Bag  $\rightarrow$  ML Algorithm

## Text classification tasks:

- predict some tags or categories
- predict sentiment for a review
- filter spam e-mails



# Week 2

Represent text as a sequence  
→ text generation

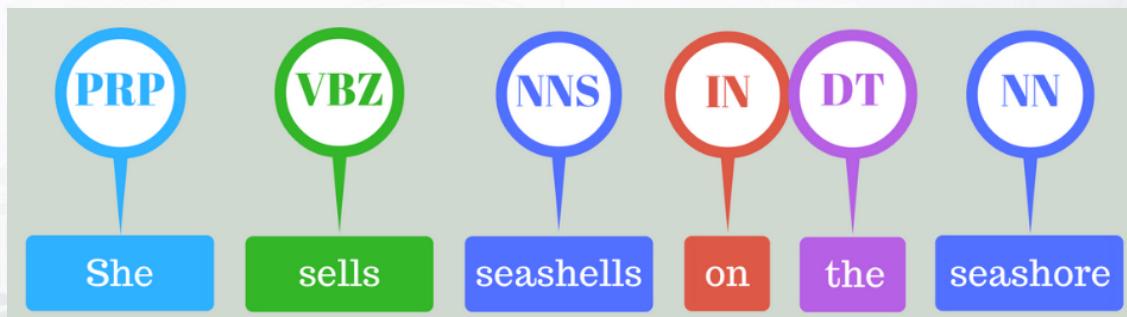
## How to predict word sequences?

Language models are needed in chat-bots, speech recognition, machine translation, summarization...

predicting the probability of next word given previous words.

## How to predict tags for the word sequences?

- Part-of-speech tags
- Named entities (names of cities and use them as features)
- Semantic slots (person want to book a table at a specific time & specific place).



# Week 3

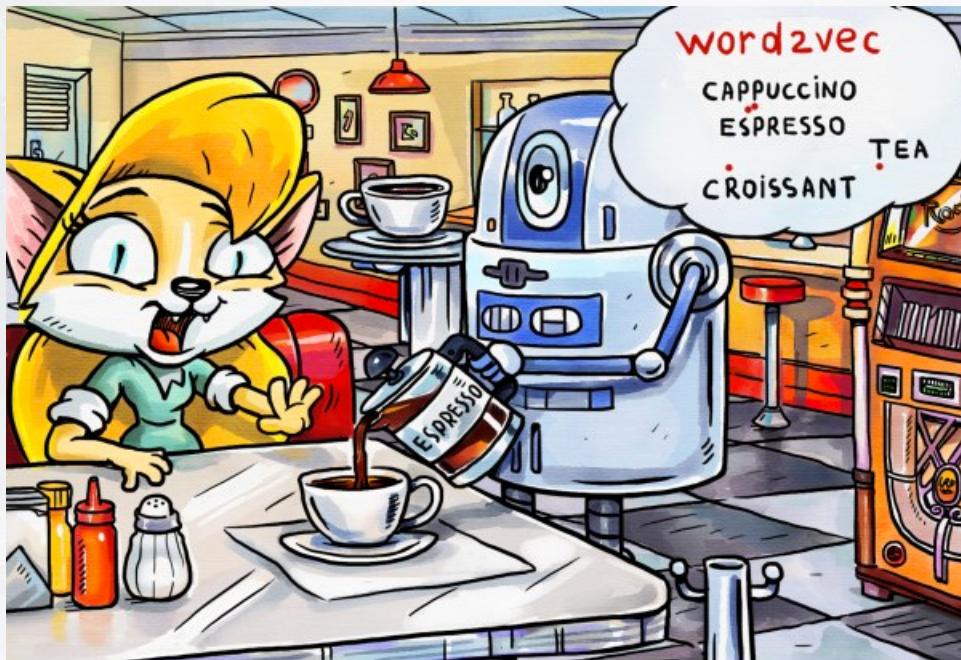
Map all the words to a vectors

words with same kind has:

similar vectors. Ex :- Cappuccino & Espresso  
are same

## How to represent a meaning of a word, a sentence, or a text?

You shall know the word by the company it keeps. (Firth, 1957)



- Espresso? But I ordered a cappuccino!
- Don't worry, the cosine distance between them is so small that they are almost the same thing.

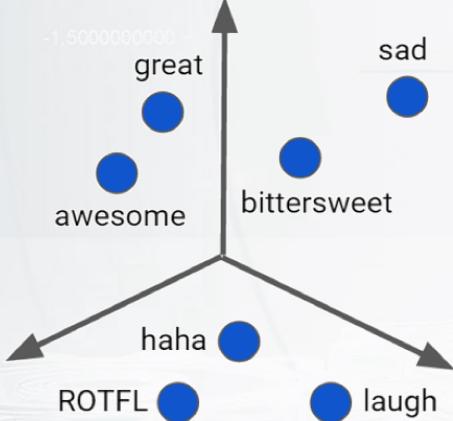
- Word embeddings
- Sentence embeddings

- Topic models
  - (documents  $\rightarrow$  what are the topics in a given document)

# Week 3

## Where do we need that?

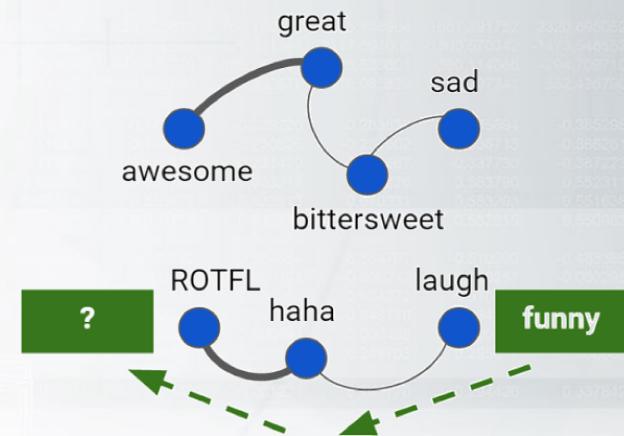
- Search, question answering, and any ranking
- Any label propagation on a word similarity graph



Word Embedding Vectors  
(dense, continuous space)



Word Similarity Graph



Learning Emotion Labels

<https://research.googleblog.com/2016/10/graph-powered-machine-learning-at-google.html>

# Week 4 Any task in NLP can be treated as sequence to sequence task.

## Sequence to sequence tasks:

- machine translation
- summarization, simplification
- conversational chat-bot

# Week 4

## Sequence to sequence tasks:

- machine translation
- summarization, simplification
- conversational chat-bot



# Week 4

## Sequence to sequence tasks:

- machine translation
- summarization, simplification
- conversational chat-bot



# Week 4

## Sequence to sequence tasks:

- machine translation
- summarization, simplification
- conversational chat-bot



# Week 4

## Sequence to sequence tasks:

- machine translation
- summarization, simplification
- conversational chat-bot



# Week 4

## Sequence to sequence tasks:

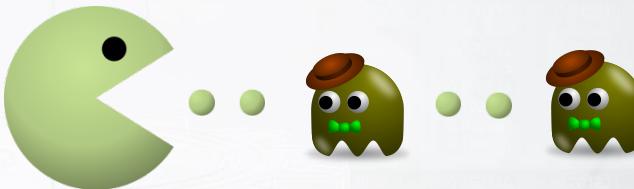
- machine translation
- summarization, simplification
- conversational chat-bot



# Week 4

## Sequence to sequence tasks:

- machine translation
- summarization, simplification
- conversational chat-bot



# Week 4

## Sequence to sequence tasks:

- machine translation
- summarization, simplification
- conversational chat-bot

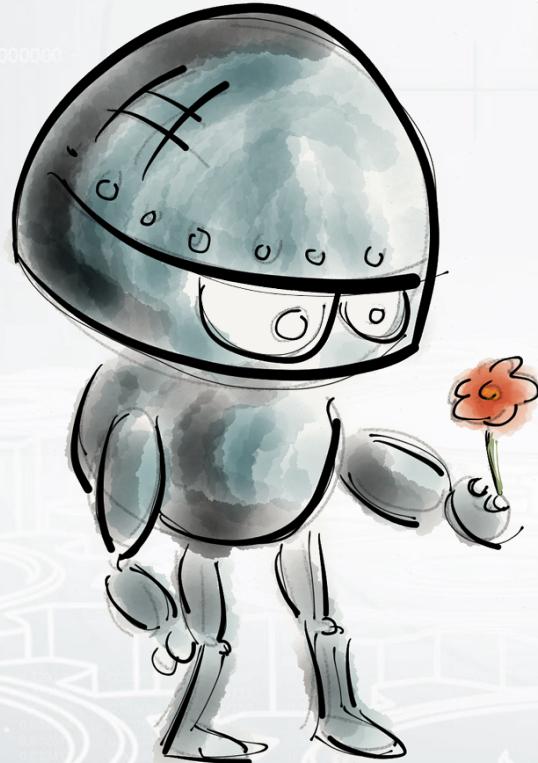


# Week 5

→ help with booking ·  
searching

**Dialogue agents** become more and more popular:

- goal-oriented (e.g. help in a call-center)
- conversational (e.g. entertainment)



## Project:

build a conversational chat-bot  
that assists with StackOverflow  
search!