**<http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%202%20-%20Natural%20Language%20Processing%20with%20Probabilistic%20Models/Week4/C2_W4_Assignment.ipynb>**

# Assignment 4: Word Embeddings

Welcome to the fourth programming assignment of Course 2. In this assignment we will show you how to compute the word embeddings. In Natural Language Processing (NLP) we can not only rely on counting the number of positive words and negative words, as we did in the last course using logistic regression. Instead we will try to find a way to represent each word by a vector. The vector could then represent syntactic (i.e. parts of speech) and semantic (i.e. meaning) structures. In this assignment you will explore a classic way of learning embeddings, or representations, of words by using a famous model called the continuous bag of words (CBOW) model. By completing this assignment you will:

* Train word vectors from scratch.
* Learn how to create batches of data.
* Understand how backpropagation works.
* Plot and visualize your learned word vectors.

Because it will take a while to train your CBOW model, you will code the model and make sure to get the expected outputs. We will give you some slightly pre-trained vectors and then you will fine tune them on the Shakespeare dataset.

Knowing how to train these models will give you a better understanding of word vectors, which are building blocks to many applications in natural language processing.

<http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb>

# Assignment 1: Sentiment with Deep Neural Networks

Welcome to the first assignment of course 3. In this assignment, you will explore sentiment analysis using deep neural networks.

## Outline

* [Part 1: Import libraries and try out Trax](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#1)
* [Part 2: Importing the data](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#2)
  + [2.1 Loading in the data](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#2.1)
  + [2.2 Building the vocabulary](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#2.2)
  + [2.3 Converting a tweet to a tensor](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#2.3)
    - [Exercise 01](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#ex01)
  + [2.4 Creating a batch generator](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#2.4)
    - [Exercise 02](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#ex02)
* [Part 3: Defining classes](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#3)
  + [3.1 ReLU class](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#3.1)
    - [Exercise 03](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#ex03)
  + [3.2 Dense class](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#3.2) 
    - [Exercise 04](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#ex04)
  + [3.3 Model](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#3.3)
    - [Exercise 05](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#ex05)
* [Part 4: Training](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#4)
  + [4.1 Training the model](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#4.1)
    - [Exercise 06](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#ex06)
  + [4.2 Practice Making a prediction](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#4.2)
* [Part 5: Evaluation](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#5) 
  + [5.1 Computing the accuracy on a batch](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#5.1)
    - [Exercise 07](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#ex07)
  + [5.2 Testing your model on Validation Data](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#5.2)
    - [Exercise 08](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#ex08)
* [Part 6: Testing with your own input](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%201/C3_W1_Assignment.ipynb#6)

<http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%202/C3_W2_Assignment.ipynb>

# Assignment 2: Deep N-grams

Welcome to the second assignment of course 3. In this assignment you will explore Recurrent Neural Networks RNN.

* You will be using the fundamentals of google's [trax](https://github.com/google/trax) package to implement any kind of deeplearning model.

By completing this assignment, you will learn how to implement models from scratch:

* How to convert a line of text into a tensor
* Create an iterator to feed data to the model
* Define a GRU model using trax
* Train the model using trax
* Compute the accuracy of your model using the perplexity
* Predict using your own model

## Outline

* [Overview](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%202/C3_W2_Assignment.ipynb#0)
* [Part 1: Importing the Data](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%202/C3_W2_Assignment.ipynb#1)
  + [1.1 Loading in the data](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%202/C3_W2_Assignment.ipynb#1.1)
  + [1.2 Convert a line to tensor](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%202/C3_W2_Assignment.ipynb#1.2)
    - [Exercise 01](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%202/C3_W2_Assignment.ipynb#ex01)
  + [1.3 Batch generator](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%202/C3_W2_Assignment.ipynb#1.3)
    - [Exercise 02](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%202/C3_W2_Assignment.ipynb#ex02)
* [Part 2: Defining the GRU model](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%202/C3_W2_Assignment.ipynb#2)
  + [Exercise 03](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%202/C3_W2_Assignment.ipynb#ex03)
* [Part 3: Training](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%202/C3_W2_Assignment.ipynb#3)
  + [3.1 Training the Model](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%202/C3_W2_Assignment.ipynb#3.1)
    - [Exercise 04](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%202/C3_W2_Assignment.ipynb#ex04)
* [Part 4: Evaluation](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%202/C3_W2_Assignment.ipynb#4)
  + [4.1 Evaluating using the deep nets](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%202/C3_W2_Assignment.ipynb#4.1)
    - [Exercise 05](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%202/C3_W2_Assignment.ipynb#ex05)
* [Part 5: Generating the language with your own model](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%202/C3_W2_Assignment.ipynb#5)
* [Summary](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%202/C3_W2_Assignment.ipynb#6)

<http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb>

# Assignment 4: Question duplicates

Welcome to the fourth assignment of course 3. In this assignment you will explore Siamese networks applied to natural language processing. You will further explore the fundamentals of Trax and you will be able to implement a more complicated structure using it. By completing this assignment, you will learn how to implement models with different architectures.

## Outline

* [Overview](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb#0)
* [Part 1: Importing the Data](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb#1)
  + [1.1 Loading in the data](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb#1.1)
  + [1.2 Converting a question to a tensor](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb#1.2)
  + [1.3 Understanding the iterator](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb#1.3)
    - [Exercise 01](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb#ex01)
* [Part 2: Defining the Siamese model](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb#2)
  + [2.1 Understanding Siamese Network](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb#2.1)
    - [Exercise 02](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb#ex02)
  + [2.2 Hard Negative Mining](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb#2.2)
    - [Exercise 03](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb#ex03)
* [Part 3: Training](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb#3)
  + [3.1 Training the model](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb#3.1)
    - [Exercise 04](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb#ex04)
* [Part 4: Evaluation](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb#4)
  + [4.1 Evaluating your siamese network](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb#4.1)
  + [4.2 Classify](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb#4.2)
    - [Exercise 05](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb#ex05)
* [Part 5: Testing with your own questions](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb#5)
  + [Exercise 06](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb#ex06)
* [On Siamese networks](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/Early_NLP-Specialization-master_deep_learning/Course%203%20-%20Natural%20Language%20Processing%20with%20Sequence%20Models/Week%204/C3_W4_Assignment.ipynb#6)

<http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/text_mining_courses_NLP/Applied-Text-Mining-in-Python-master/Week%202/Assignment%202.ipynb>

# Assignment 2 - Introduction to NLTK

In part 1 of this assignment you will use nltk to explore the Herman Melville novel Moby Dick. Then in part 2 you will create a spelling recommender function that uses nltk to find words similar to the misspelling.

## Part 1 - Analyzing Moby Dick

import nltk

nltk.download('punkt')

nltk.download('wordnet')

nltk.download('averaged\_perceptron\_tagger')

nltk.download('words')

import pandas as pd

import numpy as np

<http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/text_mining_courses_NLP/Applied-Text-Mining-in-Python-master/Week%203/Assignment%203.ipynb>

# Assignment 3

In this assignment you will explore text message data and create models to **predict if a message is spam or not.**

import pandas as pd

import numpy as np

​

spam\_data = pd.read\_csv('spam.csv')

​

spam\_data['target'] = np.where(spam\_data['target']=='spam',1,0)

spam\_data.head(10)

|  | **text** | **target** |
| --- | --- | --- |
| **0** | Go until jurong point, crazy.. Available only ... | 0 |
| **1** | Ok lar... Joking wif u oni... | 0 |
| **2** | Free entry in 2 a wkly comp to win FA Cup fina... | 1 |
| **3** | U dun say so early hor... U c already then say... | 0 |
| **4** | Nah I don't think he goes to usf, he lives aro... | 0 |
| **5** | FreeMsg Hey there darling it's been 3 week's n... | 1 |
| **6** | Even my brother is not like to speak with me. ... | 0 |
| **7** | As per your request 'Melle Melle (Oru Minnamin... | 0 |
| **8** | WINNER!! As a valued network customer you have... | 1 |
| **9** | Had your mobile 11 months or more? U R entitle... | 1 |

<http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/text_mining_courses_NLP/Natural-Language-Processing-master_HSE/week-4/week4_seq2seq.ipynb>

# Learn to calculate with seq2seq model

In this assignment, you will learn how to use neural networks to solve sequence-to-sequence prediction tasks. Seq2Seq models are very popular these days because they achieve great results in Machine Translation, Text Summarization, Conversational Modeling and more.

Using sequence-to-sequence modeling you are going to build a calculator for evaluating arithmetic expressions, by taking an equation as an input to the neural network and producing an answer as it's output.

The resulting solution for this problem will be based on state-of-the-art approaches for sequence-to-sequence learning and you should be able to easily adapt it to solve other tasks. However, if you want to train your own machine translation system or intellectual chat bot, it would be useful to have access to compute resources like GPU, and be patient, because training of such systems is usually time consuming.

### Libraries

For this task you will need the following libraries:

* [TensorFlow](https://www.tensorflow.org) — an open-source software library for Machine Intelligence.
* [scikit-learn](http://scikit-learn.org/stable/index.html) — a tool for data mining and data analysis.

If you have never worked with TensorFlow, you will probably want to read some tutorials during your work on this assignment, e.g. [Neural Machine Translation](https://www.tensorflow.org/tutorials/seq2seq) tutorial deals with very similar task and can explain some concepts to you.

### Data

One benefit of this task is that you don't need to download any data — you will generate it on your own! We will use two operators (addition and subtraction) and work with positive integer numbers in some range. Here are examples of correct inputs and outputs:

<http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/text_mining_courses_NLP/Natural-Language-Processing-master_HSE/final-project/week5_project.ipynb>

# Final project: StackOverflow assistant bot

Congratulations on coming this far and solving the programming assignments! In this final project, we will combine everything we have learned about Natural Language Processing to construct a dialogue chat bot, which will be able to:

* answer programming-related questions (using StackOverflow dataset);
* chit-chat and simulate dialogue on all non programming-related questions.

For a chit-chat mode we will use a pre-trained neural network engine available from [ChatterBot](https://github.com/gunthercox/ChatterBot). Those who aim at honor certificates for our course or are just curious, will train their own models for chit-chat.

<http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%202/C4_W2_Assignment.ipynb#2>

# Assignment 2: Transformer Summarizer

Welcome to the second assignment of course 4. In this assignment you will explore summarization using the transformer model. Yes, you will implement the transformer decoder from scratch, but we will slowly walk you through it. There are many hints in this notebook so feel free to use them as needed.

<http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%203/C4_W3_Assignment.ipynb>

# Assignment 3: Question Answering

Welcome to this week's assignment of course 4. In this you will explore question answering. You will implement the "Text to Text Transfer from Transformers" (better known as T5). Since you implemented transformers from scratch last week you will now be able to use them.

## Outline

* [Overview](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%203/C4_W3_Assignment.ipynb#0)
* [Part 0: Importing the Packages](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%203/C4_W3_Assignment.ipynb#0)
* [Part 1: C4 Dataset](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%203/C4_W3_Assignment.ipynb#1)
  + [1.1 Pre-Training Objective](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%203/C4_W3_Assignment.ipynb#1.1)
  + [1.2 Process C4](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%203/C4_W3_Assignment.ipynb#1.2)
    - [1.2.1 Decode to natural language](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%203/C4_W3_Assignment.ipynb#1.2.1)
  + [1.3 Tokenizing and Masking](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%203/C4_W3_Assignment.ipynb#1.3)
    - [Exercise 01](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%203/C4_W3_Assignment.ipynb#ex01)
  + [1.4 Creating the Pairs](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%203/C4_W3_Assignment.ipynb#1.4)
* [Part 2: Transfomer](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%203/C4_W3_Assignment.ipynb#2)
  + [2.1 Transformer Encoder](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%203/C4_W3_Assignment.ipynb#2.1)
    - [2.1.1 The Feedforward Block](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%203/C4_W3_Assignment.ipynb#2.1.1)
      * [Exercise 02](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%203/C4_W3_Assignment.ipynb#ex02)
    - [2.1.2 The Encoder Block](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%203/C4_W3_Assignment.ipynb#2.1.2)
      * [Exercise 03](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%203/C4_W3_Assignment.ipynb#ex03)
    - [2.1.3 The Transformer Encoder](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%203/C4_W3_Assignment.ipynb#2.1.3)
      * [Exercise 04](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%203/C4_W3_Assignment.ipynb#ex04)

<http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%204/utf-8''C4_W4_Assignment.ipynb>

# Assignment 4: Chatbot

Welcome to the last assignment of Course 4. Before you get started, we want to congratulate you on getting here. It is your 16th programming assignment in this Specialization and we are very proud of you! In this assignment, you are going to use the [Reformer](https://arxiv.org/abs/2001.04451), also known as the efficient Transformer, to generate a dialogue between two bots. You will feed conversations to your model and it will learn how to understand the context of each one. Not only will it learn how to answer questions but it will also know how to ask questions if it needs more info. For example, after a customer asks for a train ticket, the chatbot can ask what time the said customer wants to leave. You can use this concept to automate call centers, hotel receptions, personal trainers, or any type of customer service. By completing this assignment, you will:

* Understand how the Reformer works
* Explore the [MultiWoz](https://arxiv.org/abs/1810.00278) dataset
* Process the data to feed it into the model
* Train your model
* Generate a dialogue by feeding a question to the model

## Outline

* [Part 1: Exploring the MultiWoz dataset](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%204/utf-8''C4_W4_Assignment.ipynb#1)
  + [Exercise 01](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%204/utf-8''C4_W4_Assignment.ipynb#ex01)
* [Part 2: Processing the data for Reformer inputs](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%204/utf-8''C4_W4_Assignment.ipynb#2)
  + [2.1 Tokenizing, batching with bucketing](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%204/utf-8''C4_W4_Assignment.ipynb#2.1)
* [Part 3: Reversible layers](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%204/utf-8''C4_W4_Assignment.ipynb#3)
  + [Exercise 02](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%204/utf-8''C4_W4_Assignment.ipynb#ex02)
  + [Exercise 03](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%204/utf-8''C4_W4_Assignment.ipynb#ex03)
  + [3.1 Reversible layers and randomness](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%204/utf-8''C4_W4_Assignment.ipynb#3.1)
* [Part 4: ReformerLM Training](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%204/utf-8''C4_W4_Assignment.ipynb#4)
  + [Exercise 04](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%204/utf-8''C4_W4_Assignment.ipynb#ex04)
  + [Exercise 05](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%204/utf-8''C4_W4_Assignment.ipynb#ex05)
* [Part 5: Decode from a pretrained model](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%204/utf-8''C4_W4_Assignment.ipynb#5)
  + [Exercise 06](http://localhost:8888/notebooks/Downloads/1PHD_RUAS/1module_606/specializationCourse/NLP/NLP-Specialization-master_deep_learning/Course%204%20-%20Natural%20Language%20Processing%20with%20Attention%20Models/Week%204/utf-8''C4_W4_Assignment.ipynb#ex06)