Deep Learning and Word Embeddings Created from Online Course Reviews for Sentiment Analysis

Danilo Dessì[1], Mauro Dragoni[2], Mirko Marras[1], Diego Reforgiato Recupero[1]

[1]Department of Mathematics and Computer Science, University of Cagliari

[2]Fondazione Bruno Kessler

{danilo_dessi, mirko.marras, diego.reforgiato}@unica.it dragoni@fbk.eu

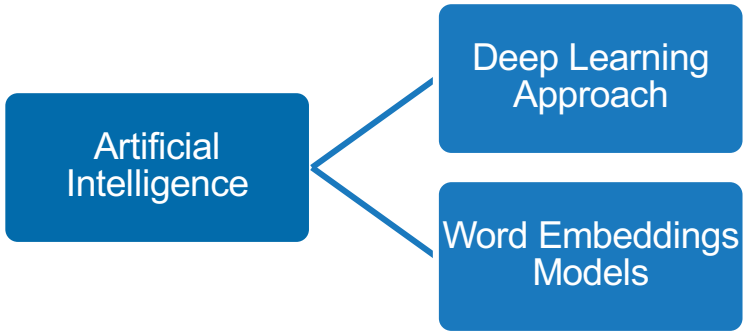
UNIONE EUROPEA
Fondo sociale europeo

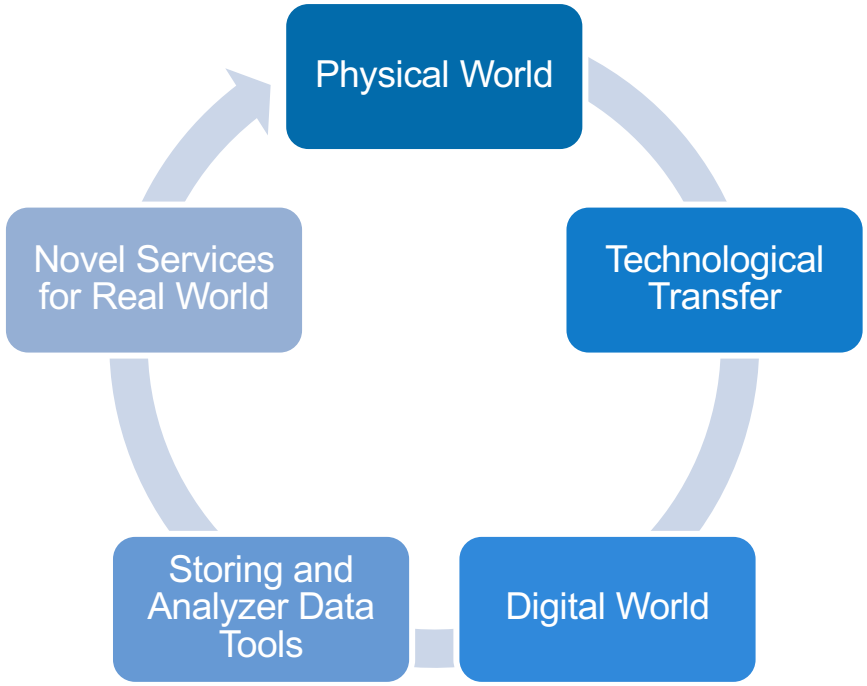
REGIONE AUTONOMA DELLA SARDEGNA

POR SARDEGNA

Motivation

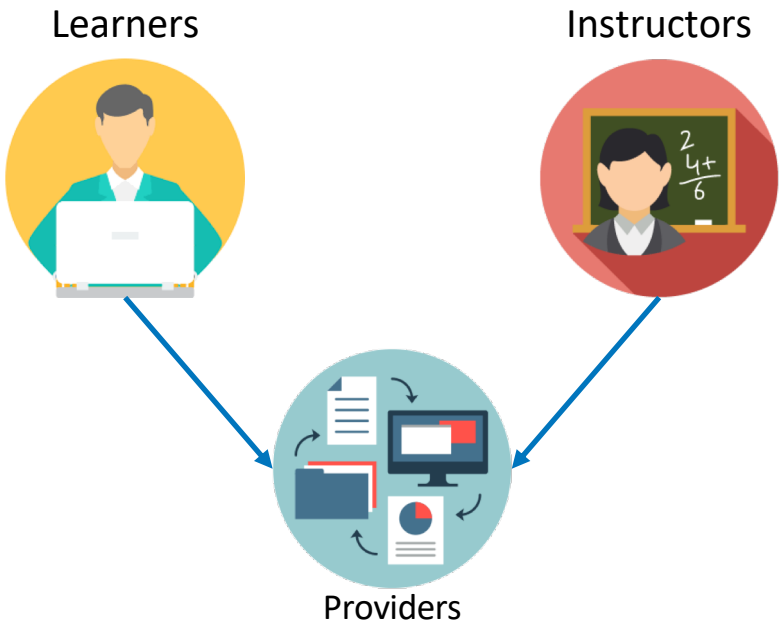
- Today more and more people express their opinions in online platforms
- The use of Artificial Intelligent approaches has showed remarkable improvements in many domains
- Recent methods to capture and represent knowledge are Word Embeddings





Reference Domain: E-Learning

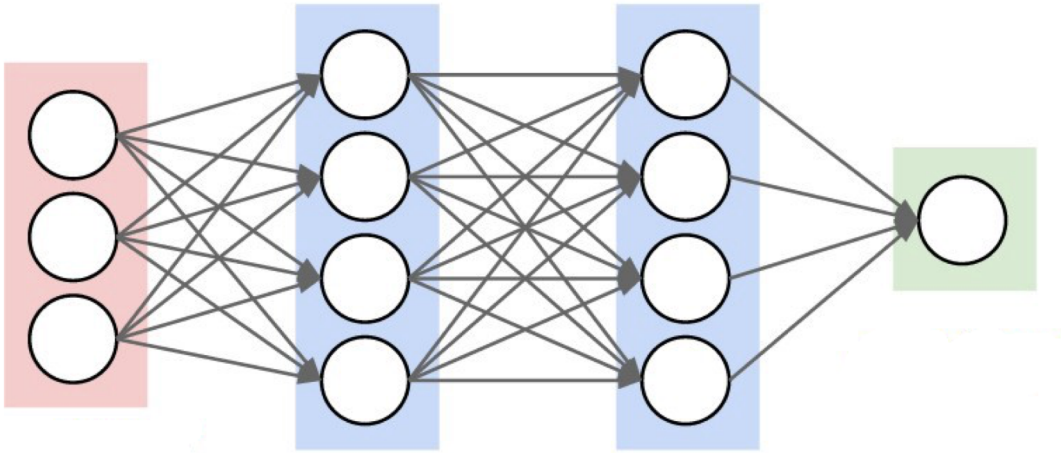
- There is a technological transfer of teaching material, learning tools, lessons in e-learning platforms
- Students express their opinions about courses
- The analysis of students' opinions is useful to evaluate courses quality and to make courses recommendation



Udemy coursera edX

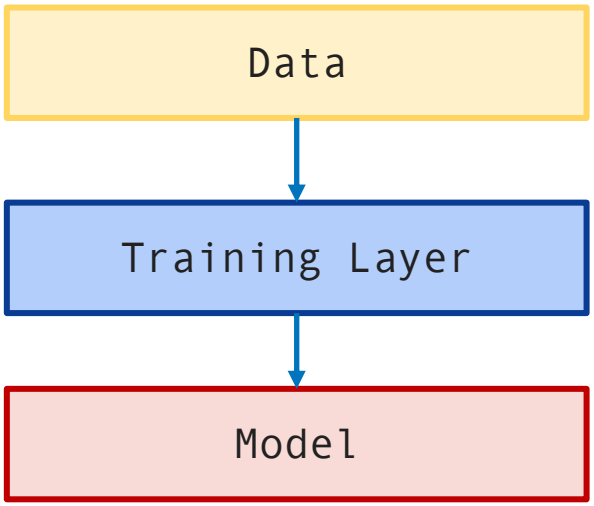
Deep Learning

- The Deep Learning refers to Machine Learning methods inspired by biological nervous systems that are able to learn from data
- They have nodes that simulate neurons functions
- The output of a network depends on connections between network layers and functions that nodes implement



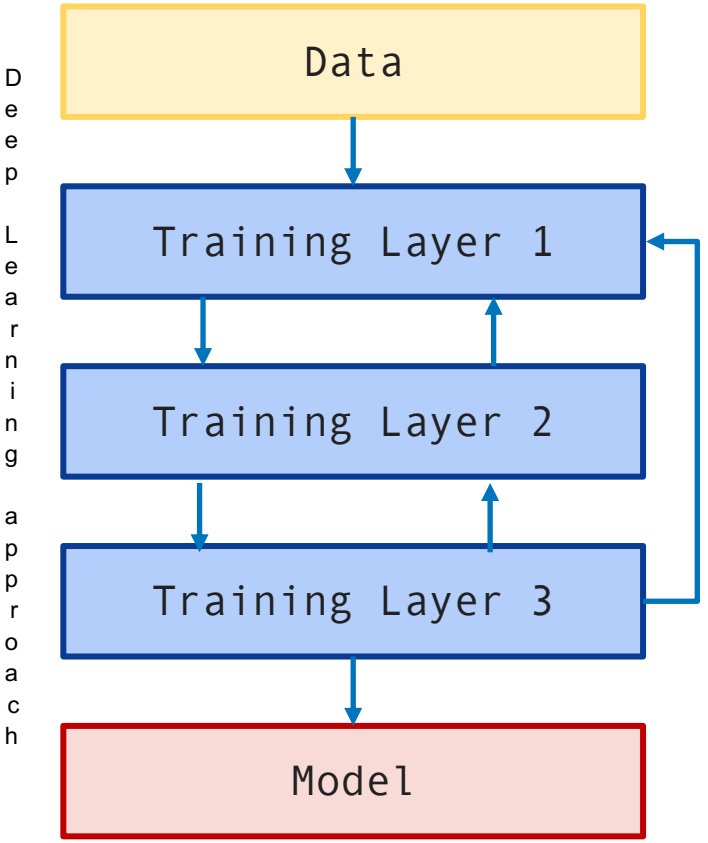
Deep Learning VS Common Machine Learning

Common approaches



- In a Deep Learning approach each layer can see what others did in order to improve results
- Common approaches: Random Forests, Simple Neural Networks, Support Vector Machines

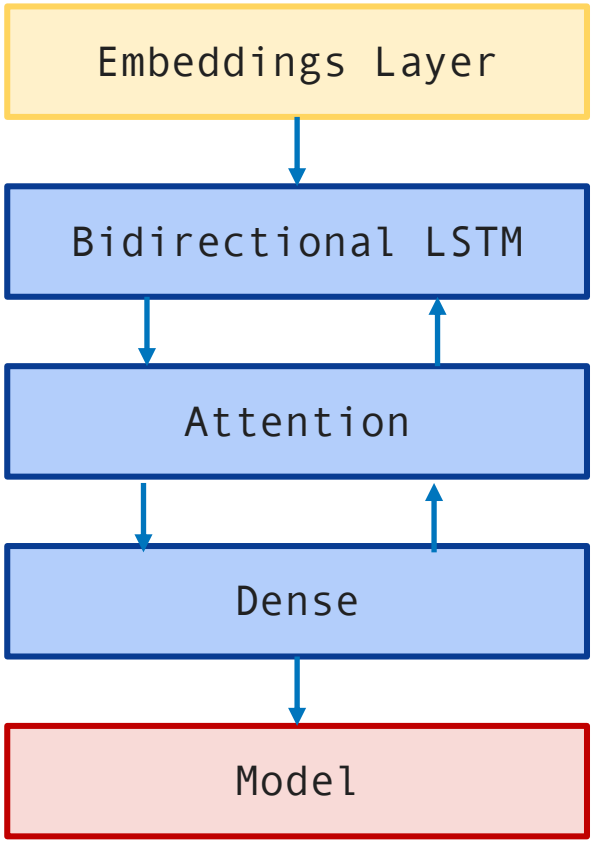
Deep Learning approach



University of Cagliari

Our Deep Learning Model

Data representation



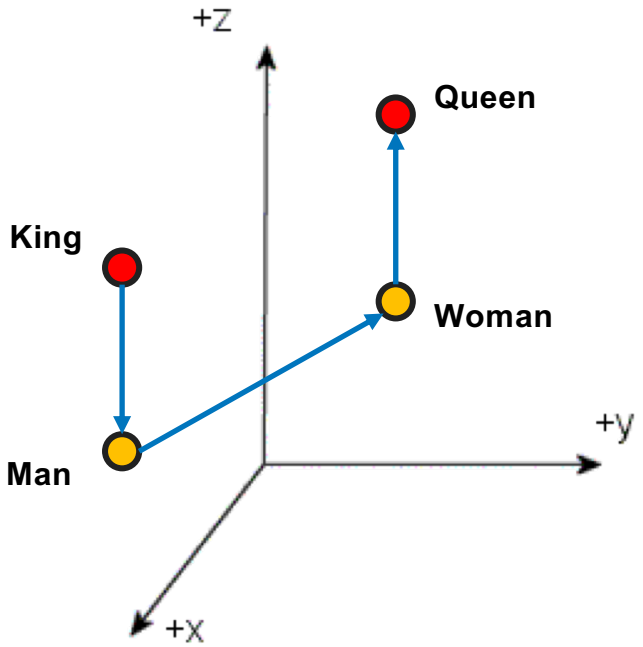
Double direction sequential classification of patterns that appear in data

Reference to the input network for contextualizing current results

Densely-connected layer that provides an unique result

Word Embeddings

- Words Embeddings are numerical vectors that represents words
- They capture the syntactic and semantic of words functions



King – Man + Woman = Queen

University of Cagliari

Word Embeddings Generators

word2vec

fastText

GloVe

The COCO Dataset

43K Courses

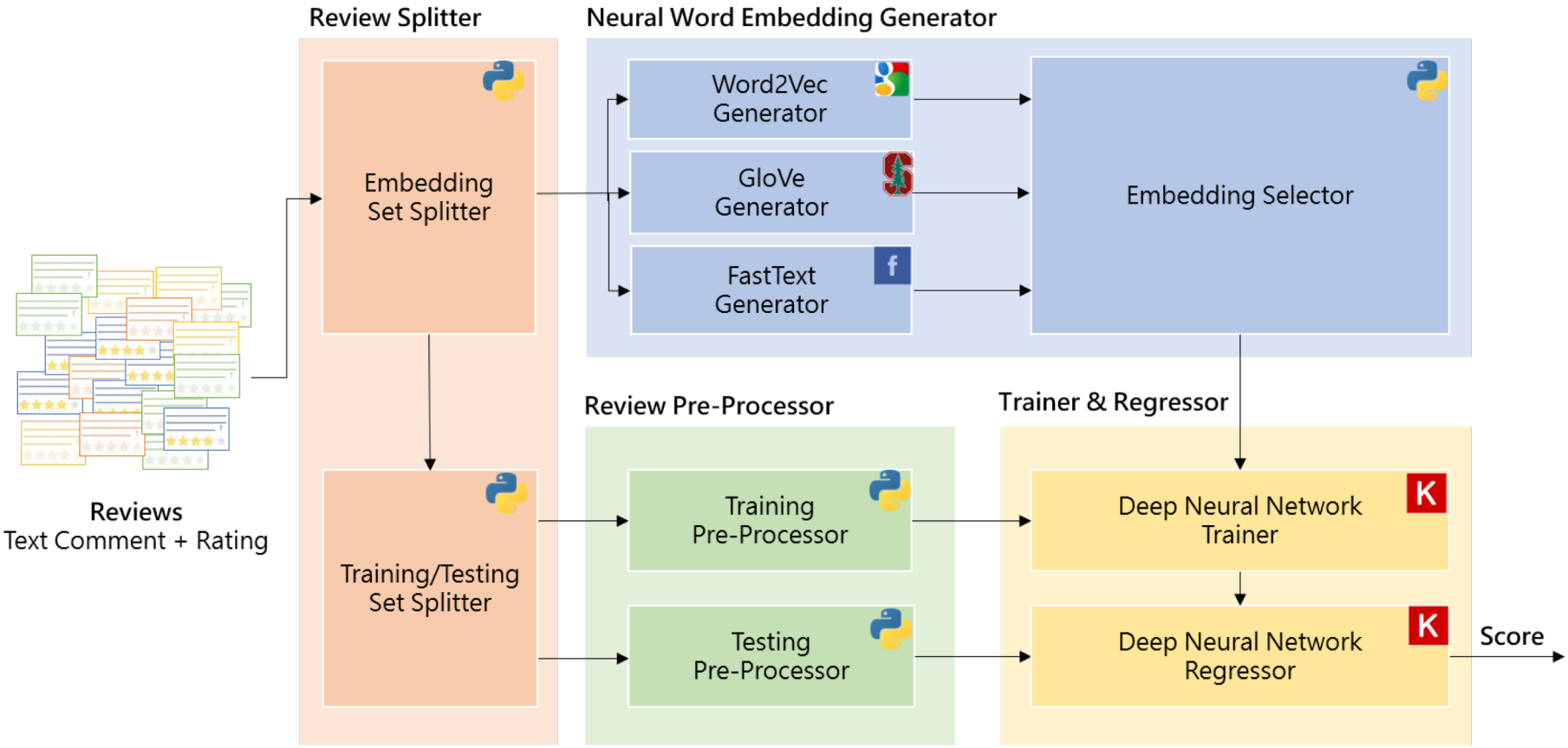
16K Instructors

2,5M Learners

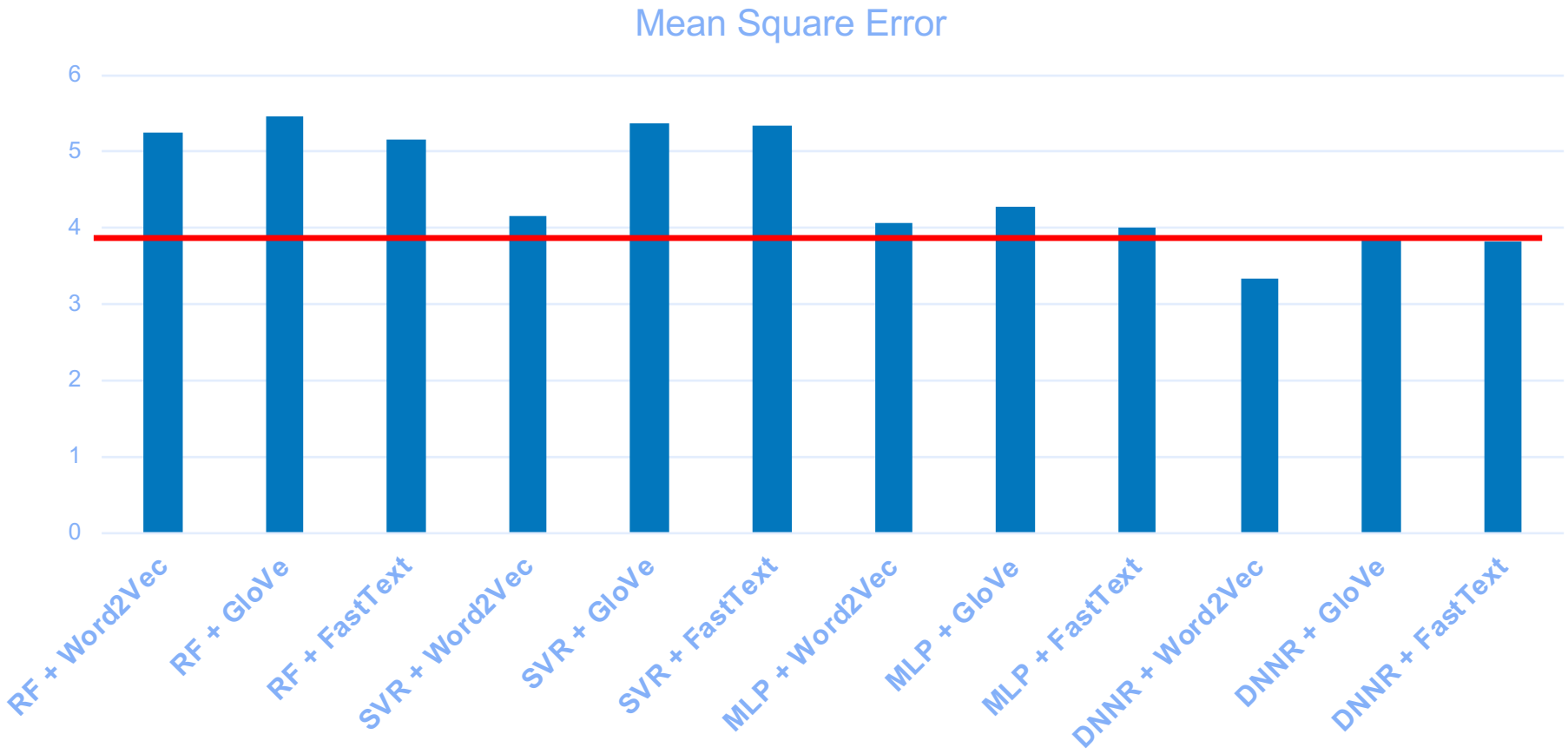
4,5M Ratings

1,2M Reviews

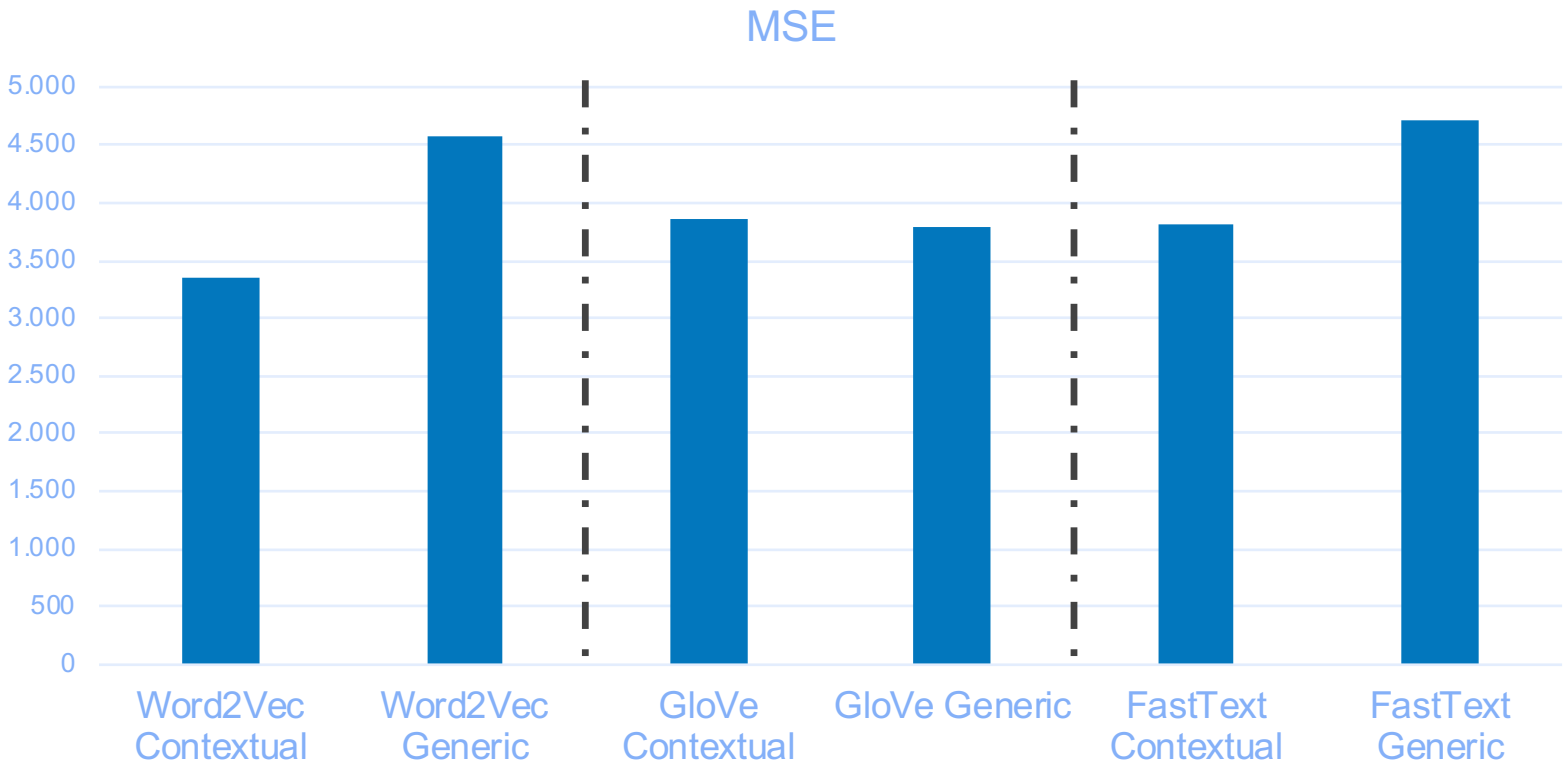
Our Approach



Deep Learning Improvements



Word Embeddings Comparison



Consortium GARR

Thank you for your attention

UNIONE EUROPEA
Fondo sociale europeo

REGIONE AUTONOMA DELLA SARDEGNA

POR SARDEGNA
obiettivo competitività regionale e occupazione