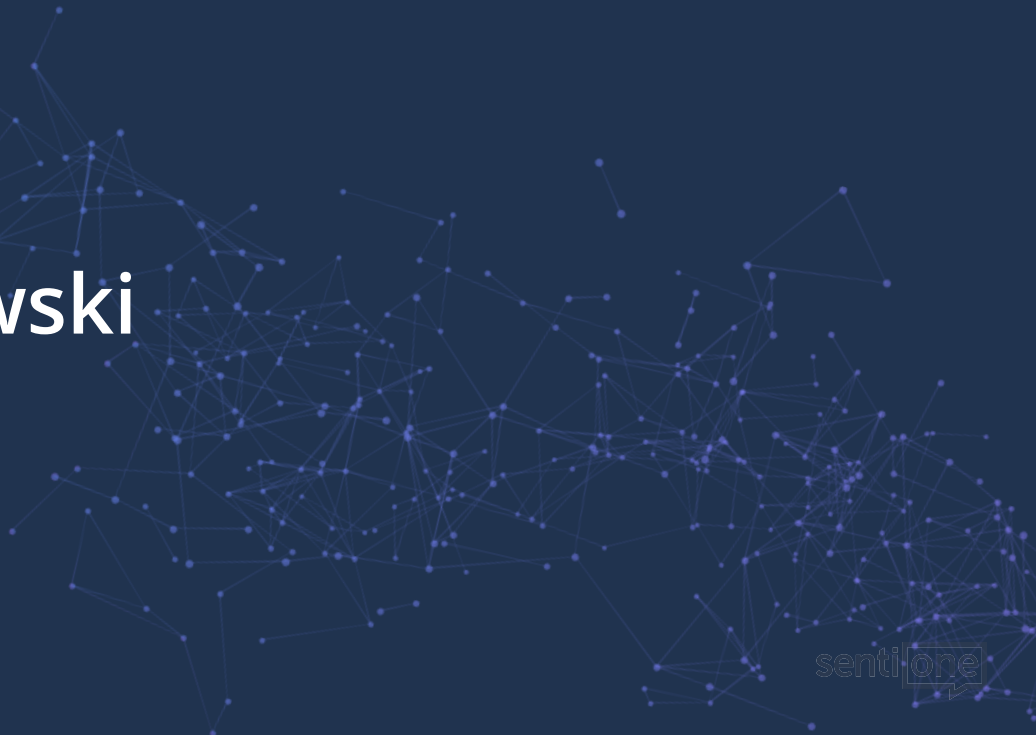
Głębokie uczenie w chat-botach i systemach automatycznej odpowiedzi

Speaker

Aleksander Obuchowski



Projekty badawcze finansowane przez NCBIR:

- Strukturyzacja treści w internecie (3,5 mln zł)
- Automatyzacja monitoringu i obsługi klienta (13 mln zł)
- SentiConverse (3 mln zł)

Analizowane treści:

- 30 miliardów wypowiedzi internautów w 26 językach
- 40 milionów nowych wypowiedzi

Konspekt

Jak działają chat-boty:

- Detekcja intencji
- Wykrywanie encji

Wektory zanurzeń słów:

- Reprezentacje słów
- CBOW i Skip-Gram
- Fasttext

Architektury sieci neuronowych w NLP:

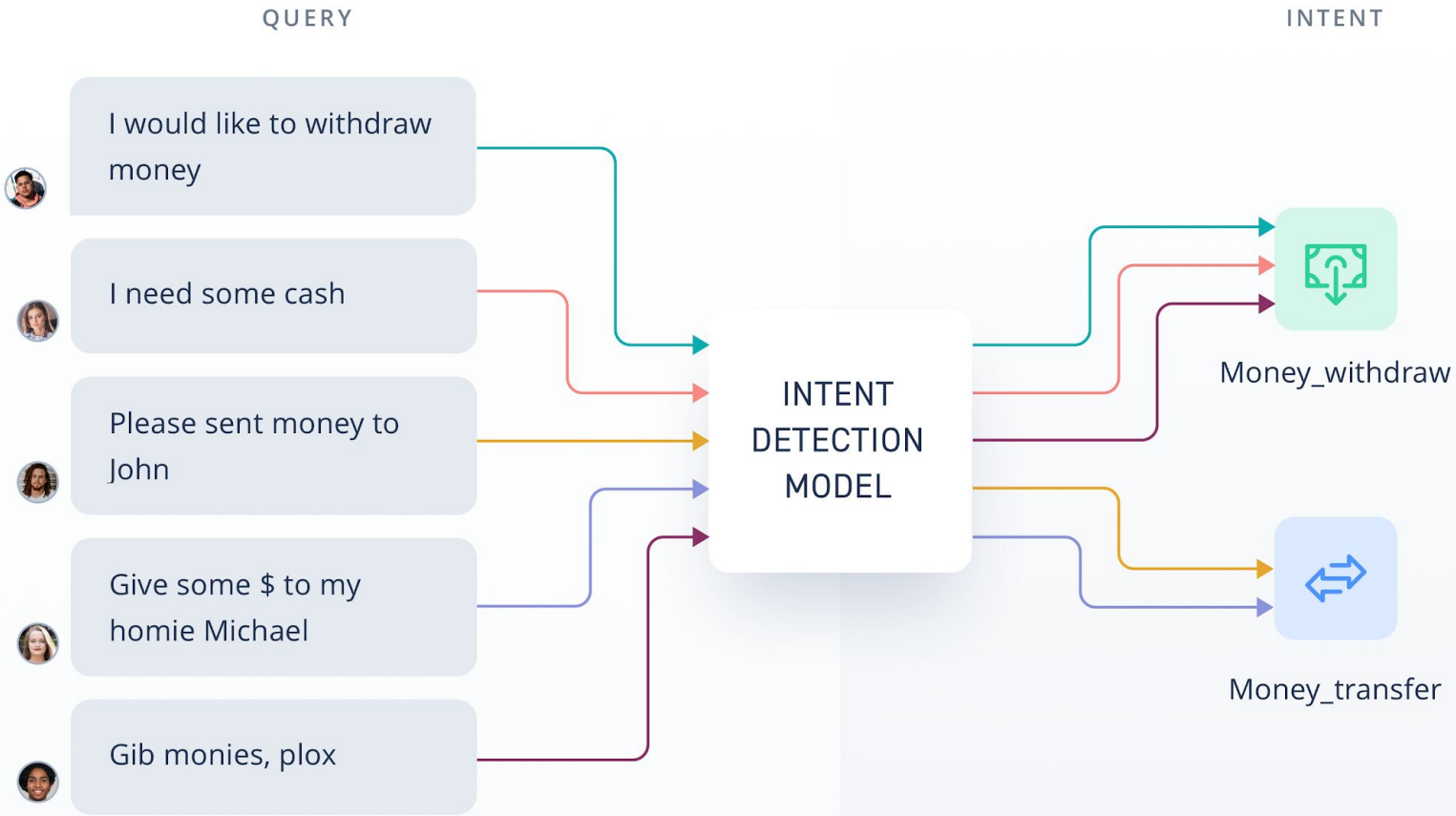
- LSTM
- CNN
- Transformer
- Transformer- Capsule

Pre-trening

- Flair
- ELMO
- USE

Jak działają chat-boty?

Detekcja intencji



Wykrywanie encji

Wyślij pieniądze do Jana Kowalskiego
person

Zrób przelew z konta osobistego
source
na konto oszczędnościowe
destination
dwieście złotych
ammount

Podstawowe zadania chat-bota

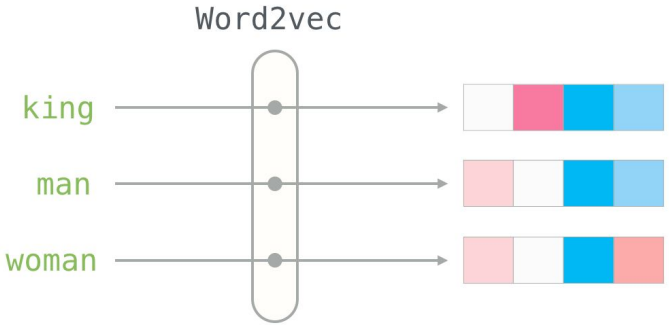
Określenie co użytkownik chce zrobić - Text Classification

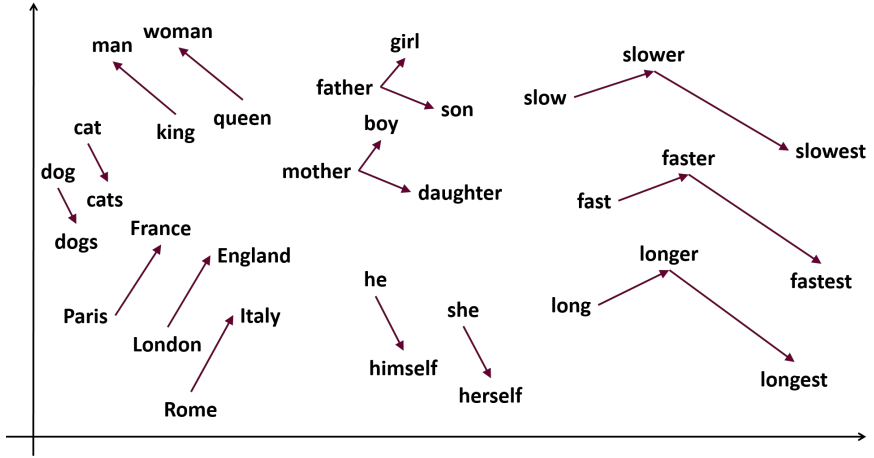
Ustalenie parametrów tego co chce zrobić - Sequence Labeling

sentione

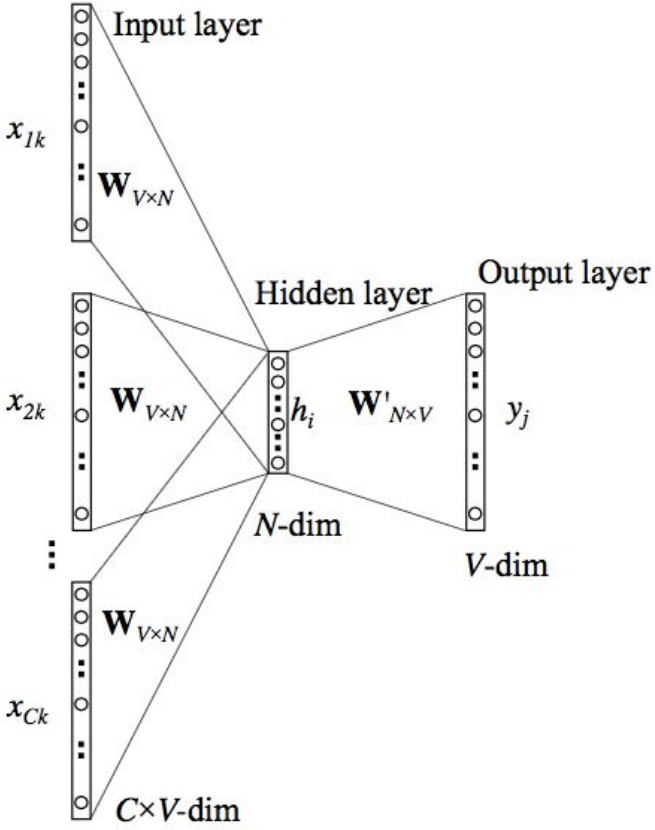
Wektory zanurzeń słow

Wprowadzenie?

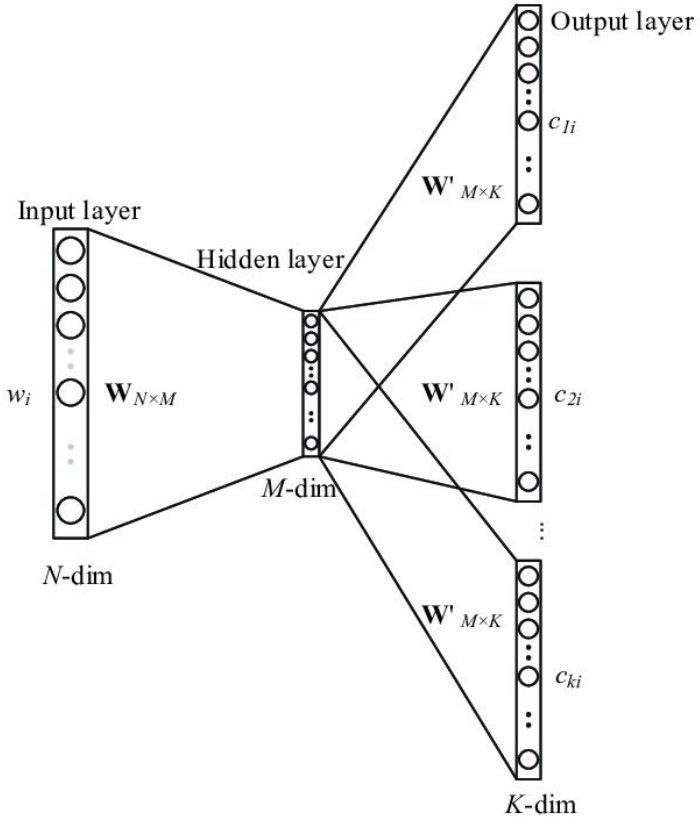




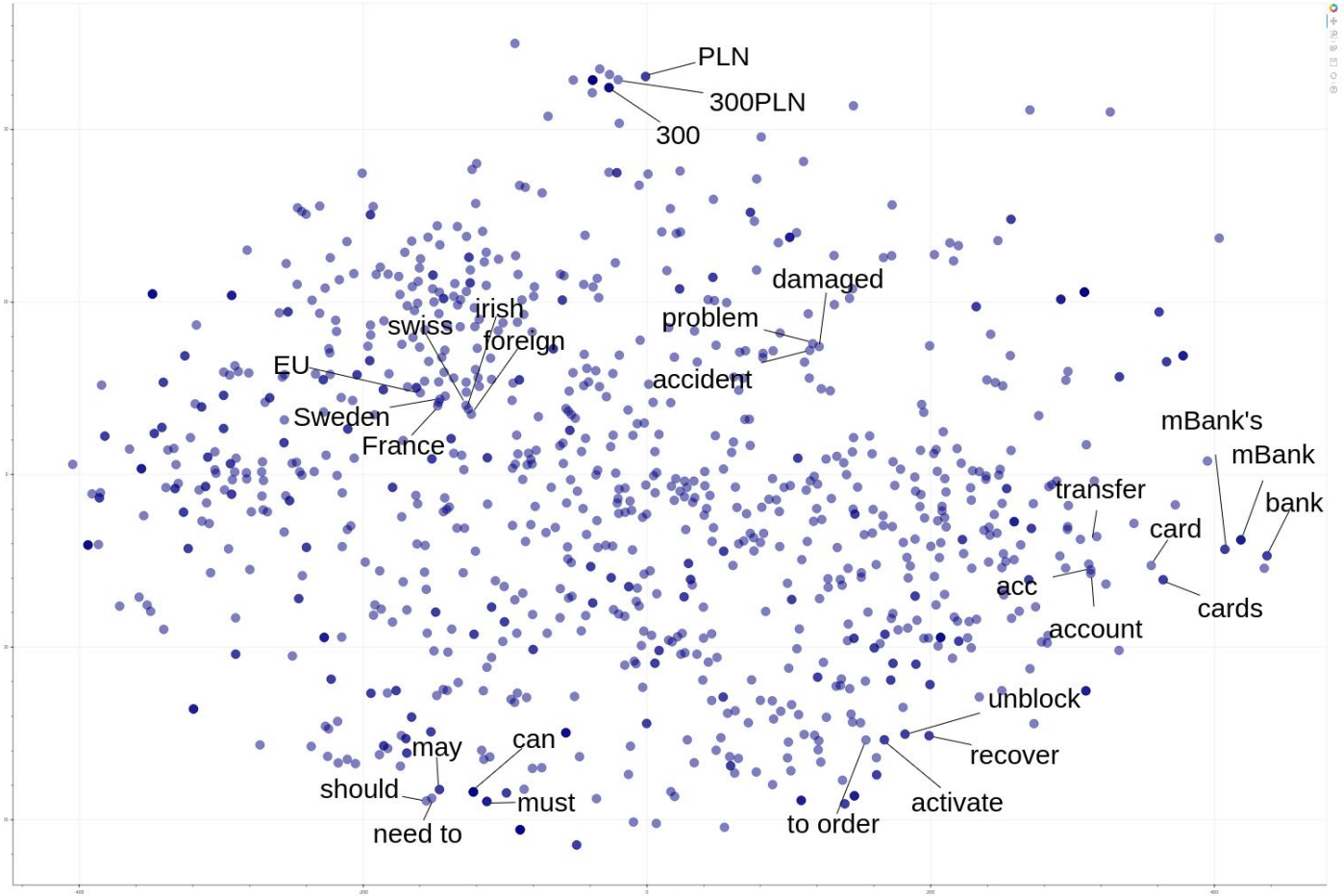
Continuous Bag of Words (CBOW)



Skip-Gram


Output layer
c_{1i}
$\mathbf{W'}_{M\times K}$
Input layer
Hidden layer
w_i
$\mathbf{W}_{N\times M}$
$\mathbf{W'}_{M\times K}$
c_{2i}
M-dim
N-dim
$\mathbf{W'}_{M\times K}$
c_{ki}
K-dim

Efekt - przykład z domeny bankowej

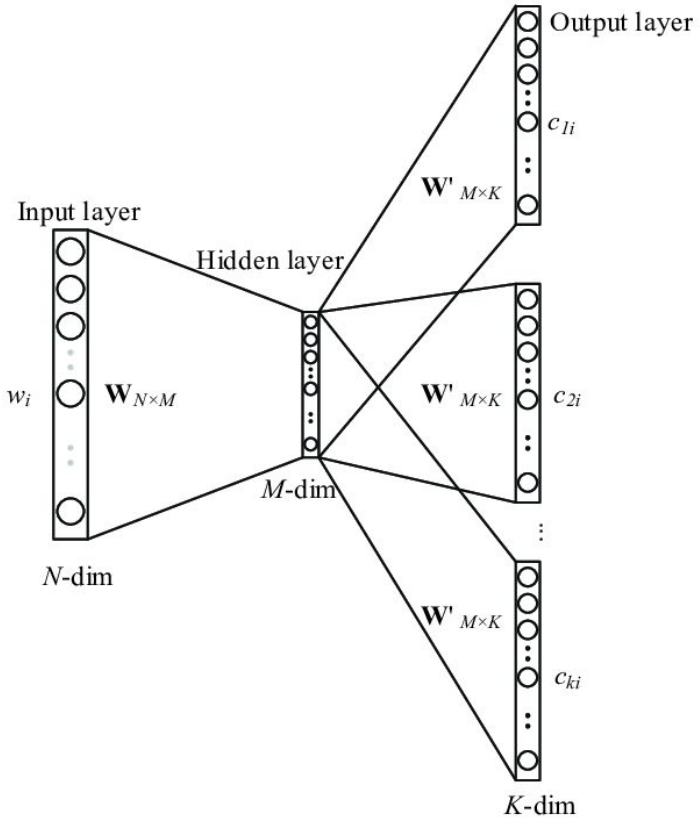


senti one

Fasttext

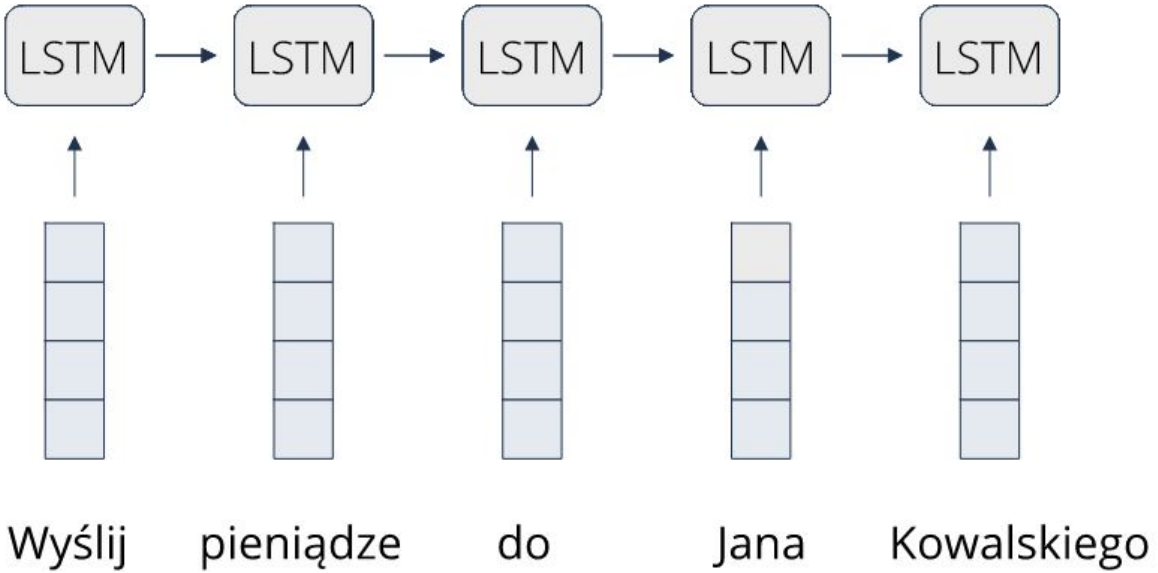
<wh, whe, her, ere, re>

<where>.

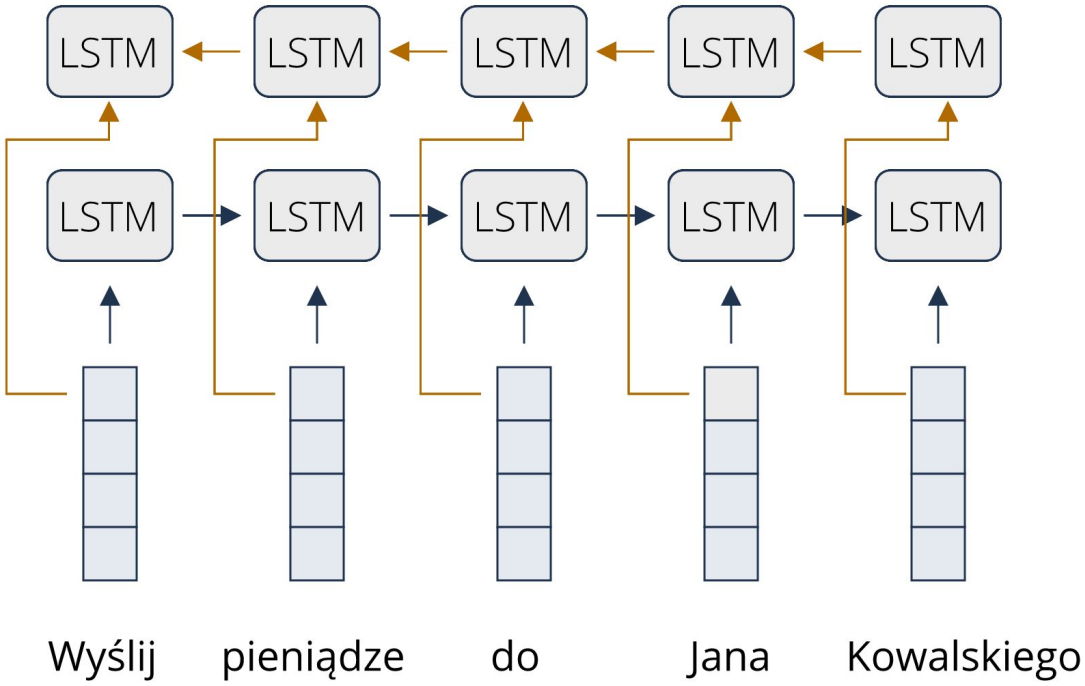


Architektury sieci neuronowych

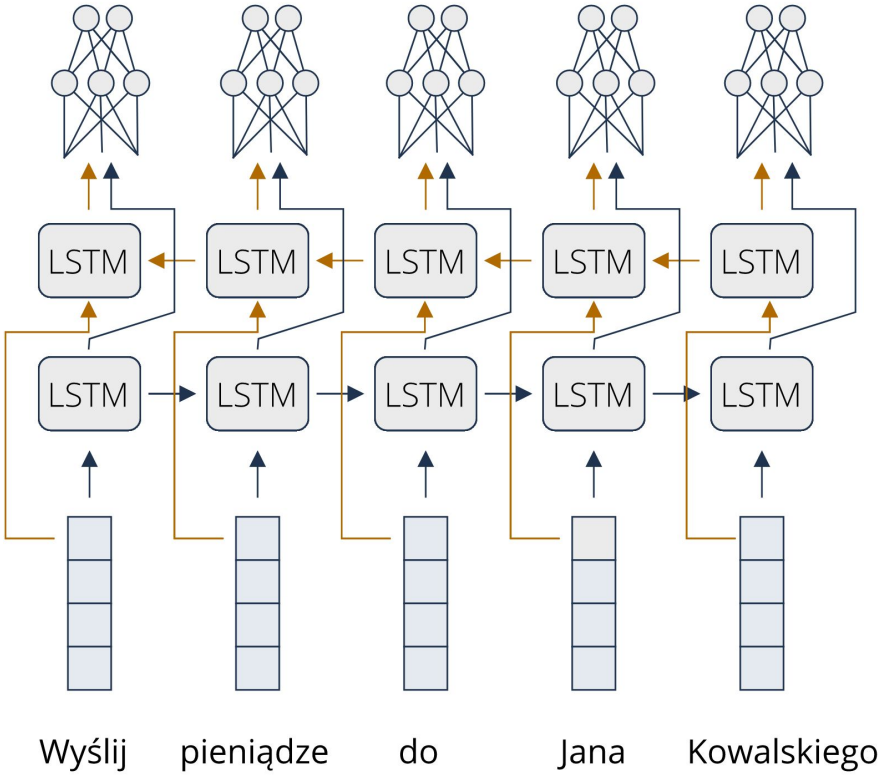
LSTM



BiLSTM



BiLSTM do oznaczania sekwencji



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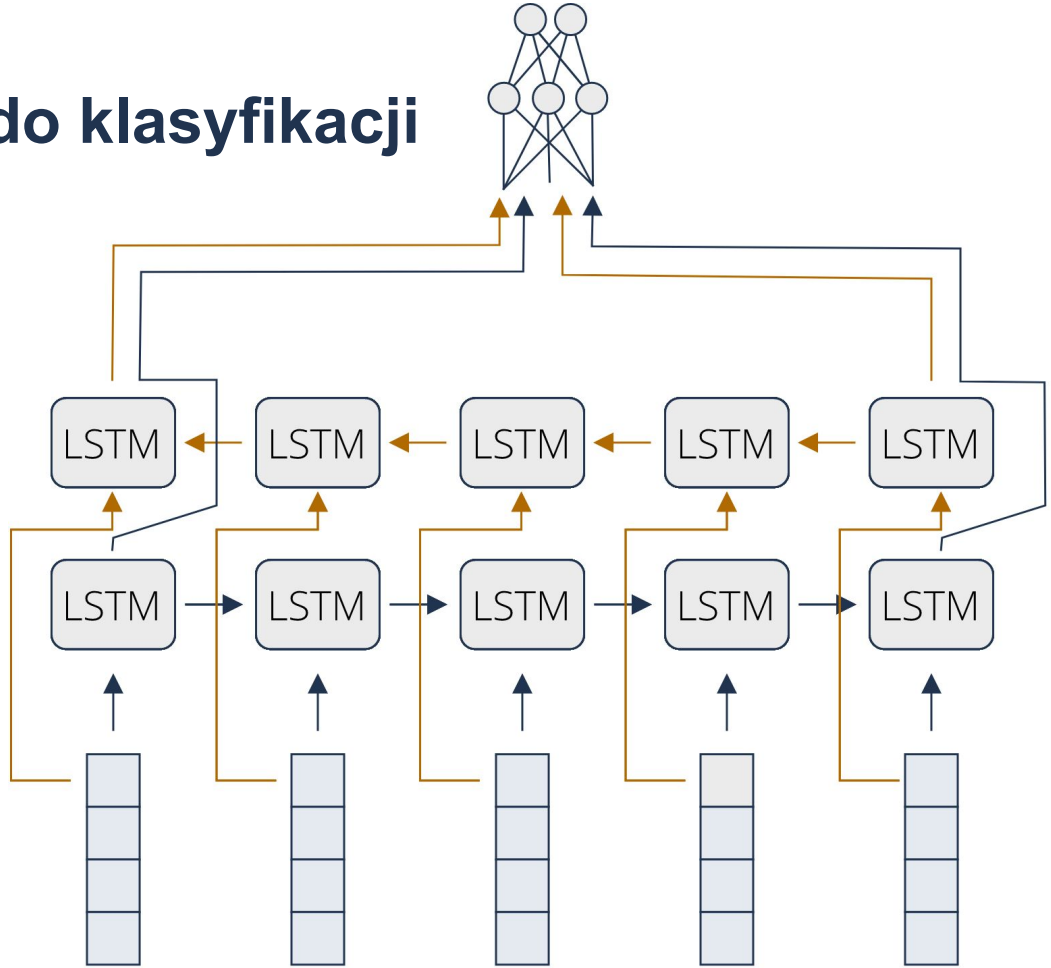
BiLSTM do klasyfikacji



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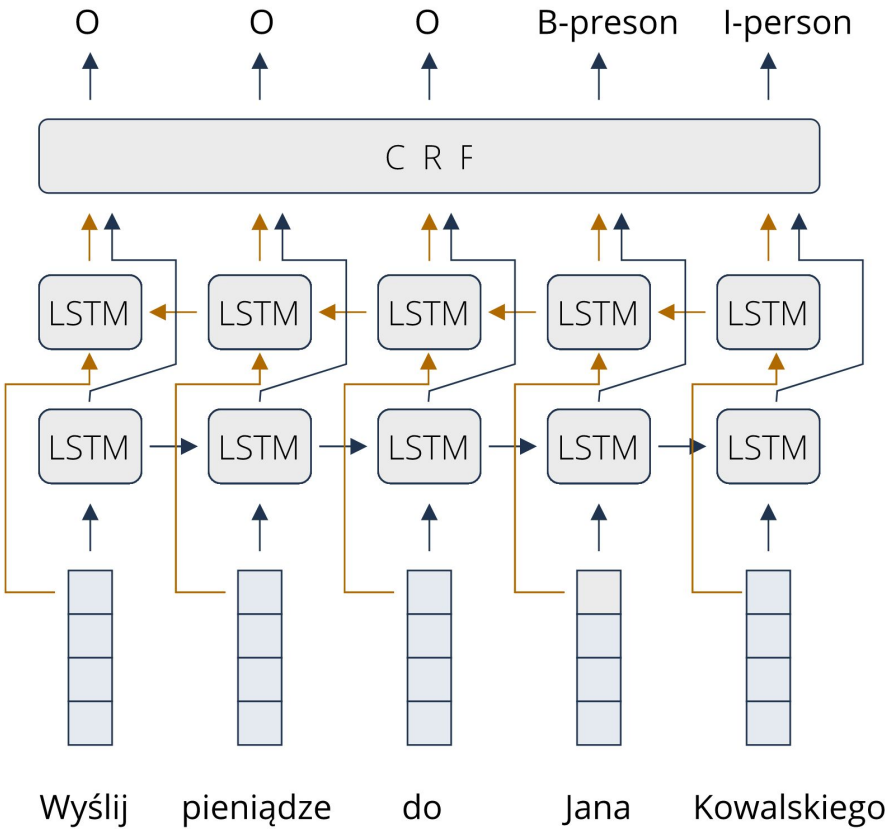
BiLSTM + CRF do oznaczania sekwencji



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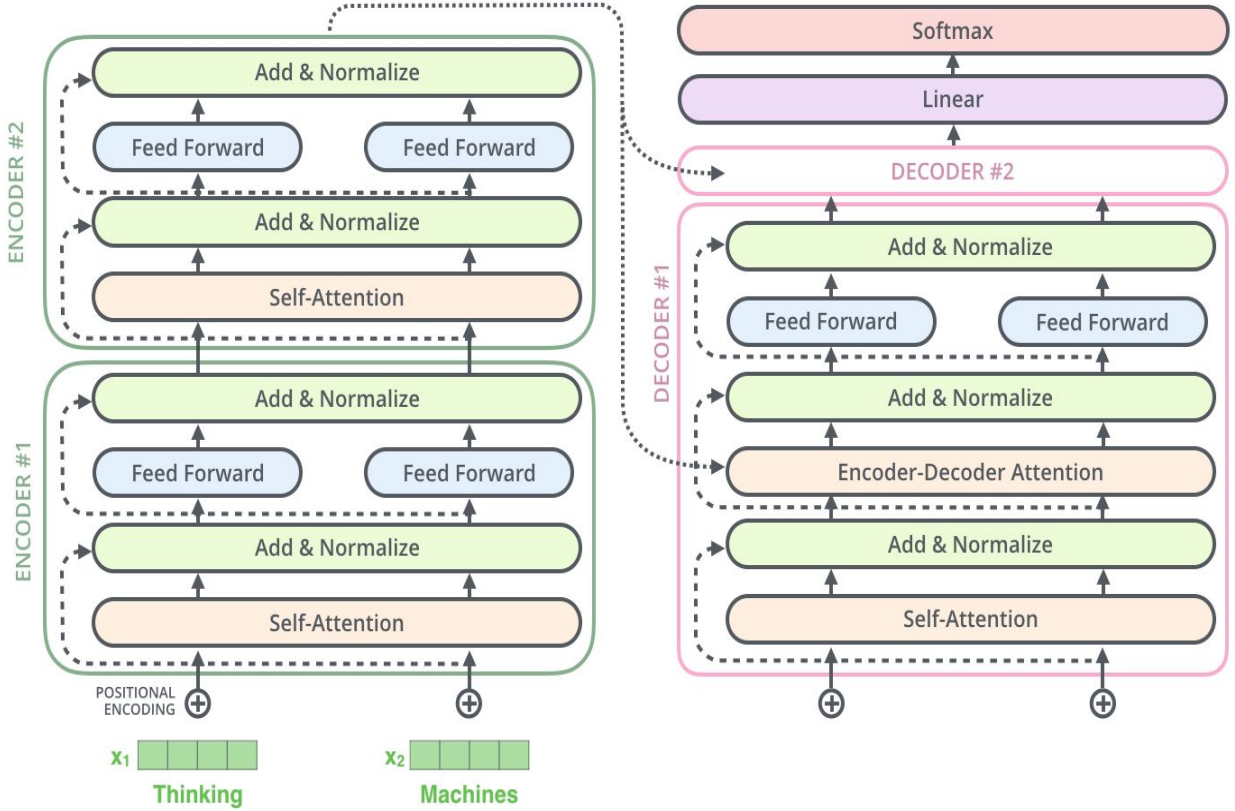
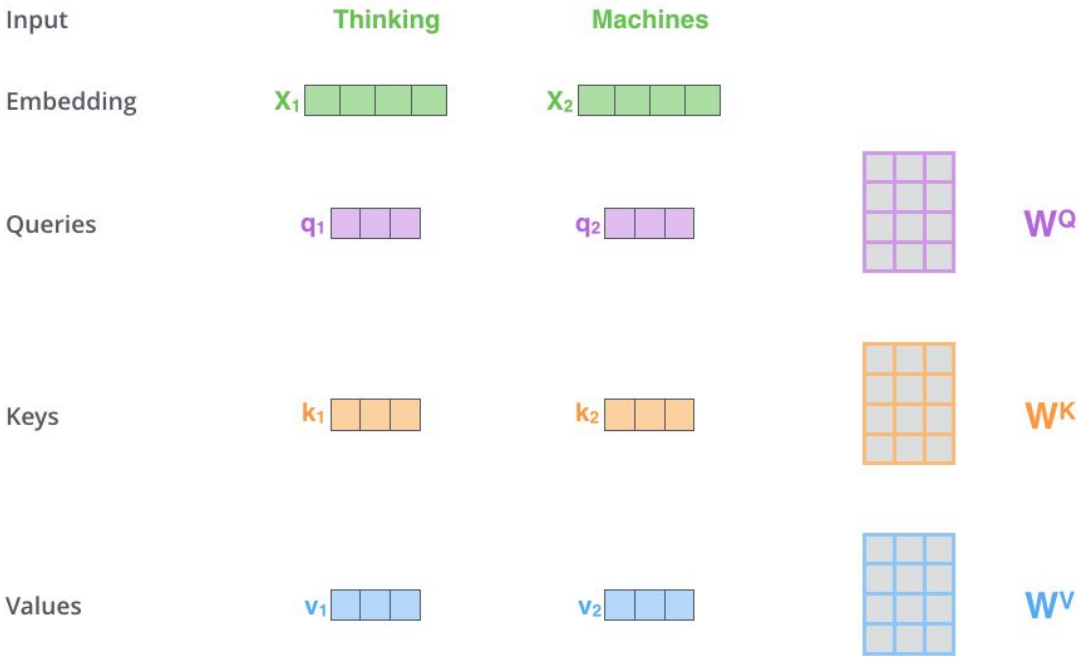
Transformer



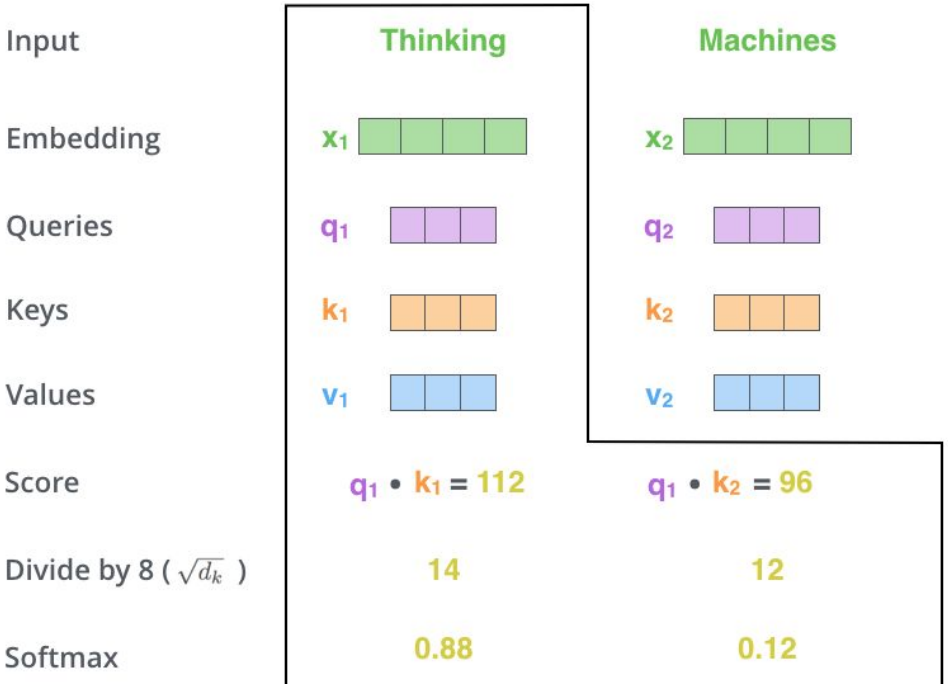
The Illustrated Transformer by **Jay Alammar**

Self - Attention



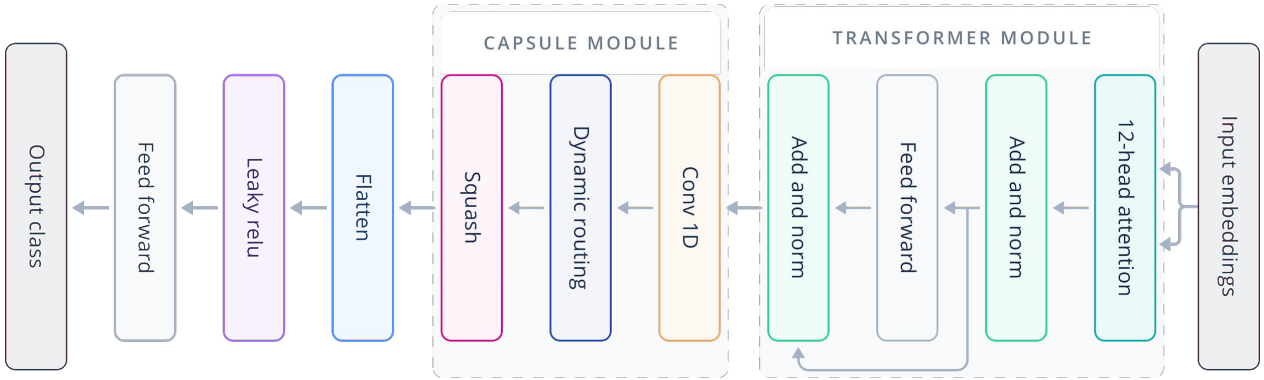
The Illustrated Transformer by **Jay Alammar**

Self - Attention



The Illustrated Transformer by **Jay Alammar**

Model Transformer-Capsule do detekcji intencji



Aleksander Obuchowski and Michał Lew. 2020. Transformer-Capsule Model for Intent Detection. In Proceedings of the AAAI conference on artificial intelligence

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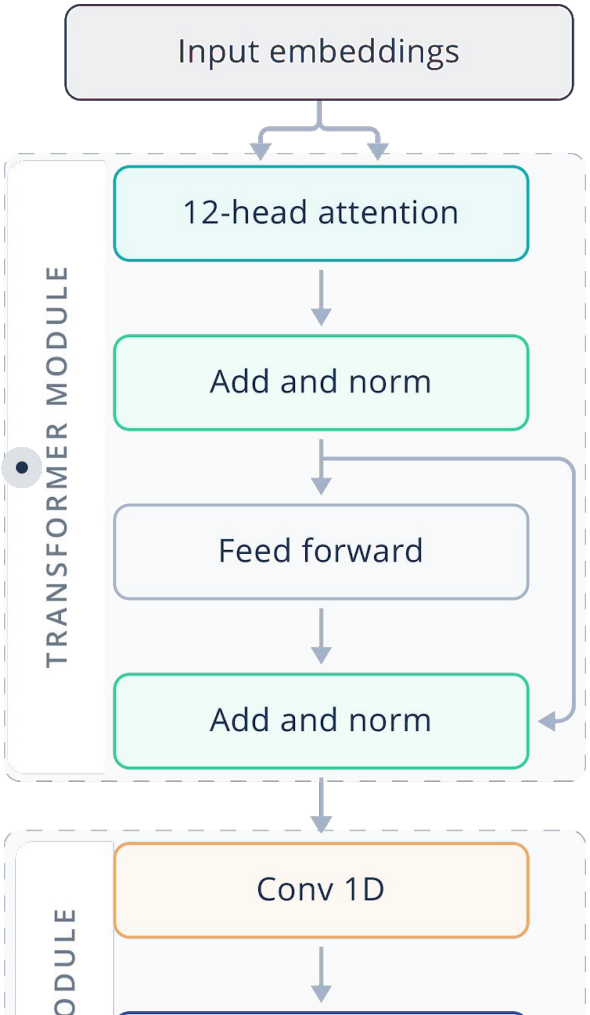
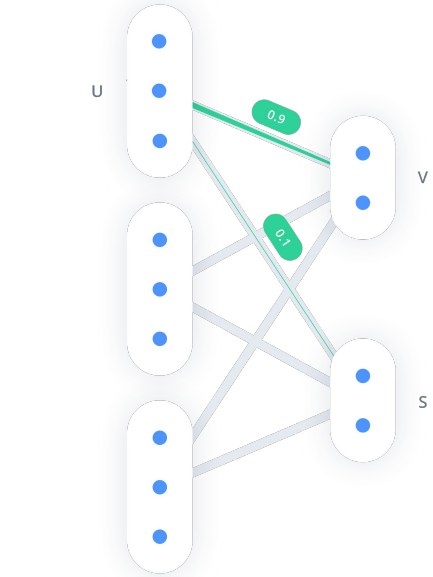
Transformer module

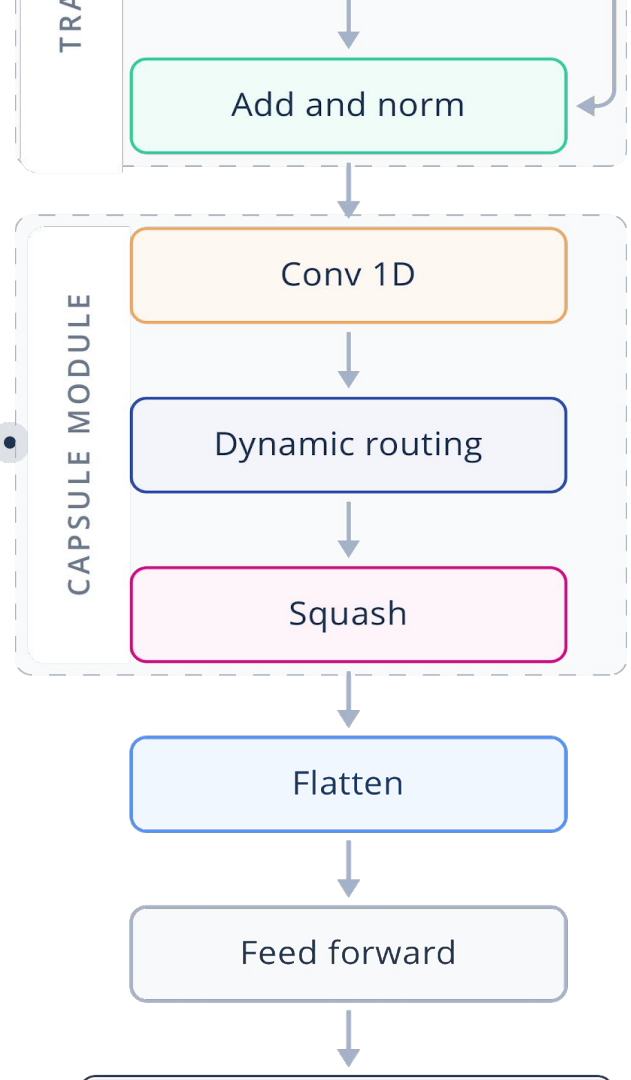
Single layer transformer encoder with 12-head attention and feed-forward layer with hidden dimension of 300.



Capsule module

100 capsules with 15 dimensions each. Dynamic routing performed 4 times. Squash function on the capsules output.





Wyniki

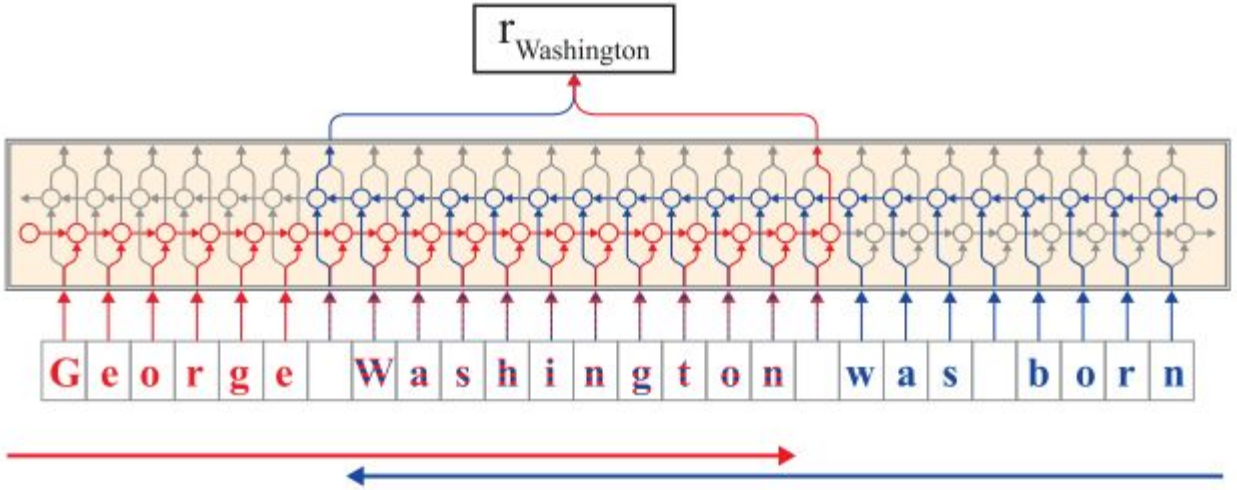
	ATIS
CAPSULE-NLU	0.950
WAIS	0.9861
Transformer-Capsule	**0.9889**

	AskUbuntu	WebApp
Botfuel	0.90	0.80
Luis	0.90	0.81
API (DialogFlow)	0.85	0.80
Watson	0.92	0.83
RASA	0.86	0.74
Snips	0.83	0.78
Recast	0.86	0.75
SSH	0.94	0.85
Transformer-Capsule	**0.98**	**0.92**

Automatic Answers

Pre-training

Flair



Publication: Contextual string embeddings for sequence labeling

sentione

Google

flair library

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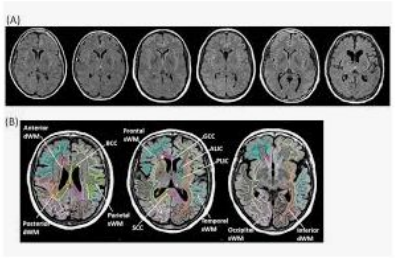
madl pipeline | fashion flair | nicolas vienne | traditions | interior | nlp | paris fashion | python | text classification

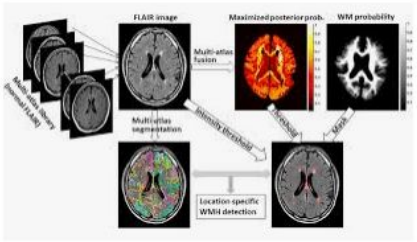


The FLAIR multi-atlas library. (A ...
researchgate.net

Text Classification with State of the ...
mc.ai

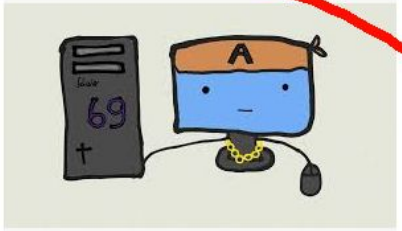
A Simple yet Powerful State-of-the ...
medium.com

A Simple yet Powerf
medium.com



MADL pipeline. A multi-atlas library ...
researchgate.net

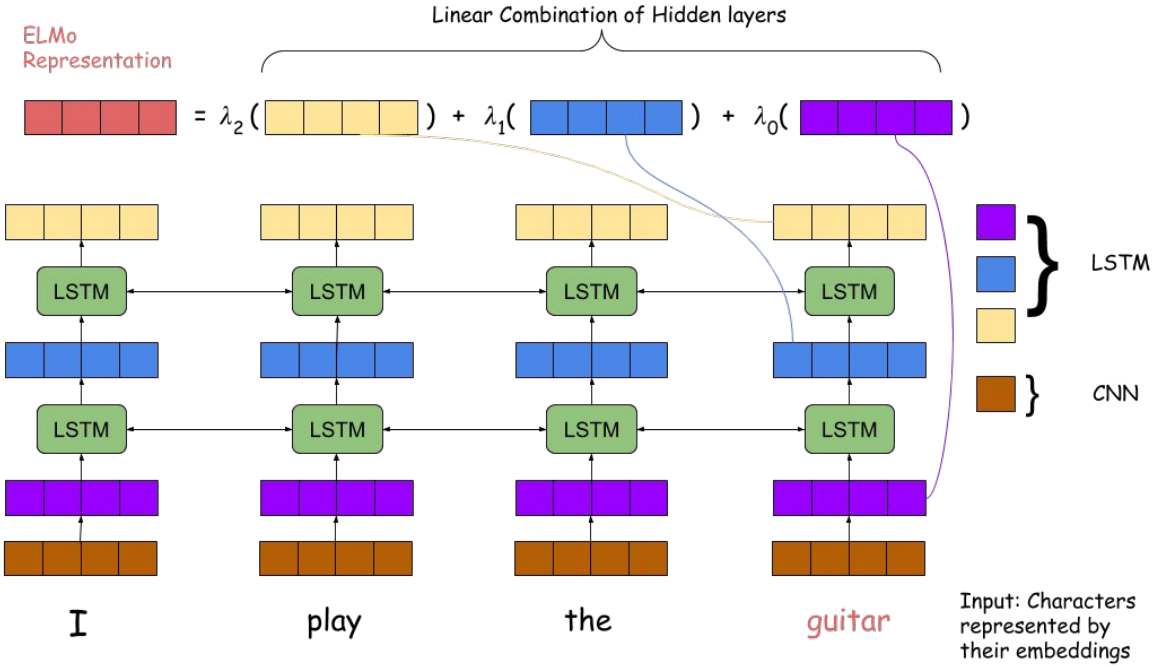
Zalando | Jobs
jobs.zalando.com



GitHub - AleksanderObuchowski/Flair-Rap ...
github.com

25 Di ng Rooms ar
nterest.com

ELMO



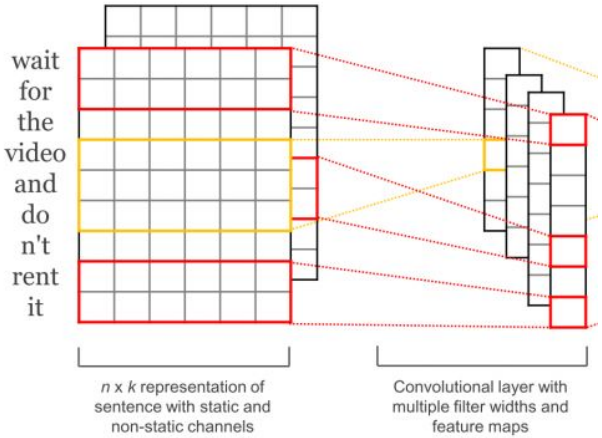
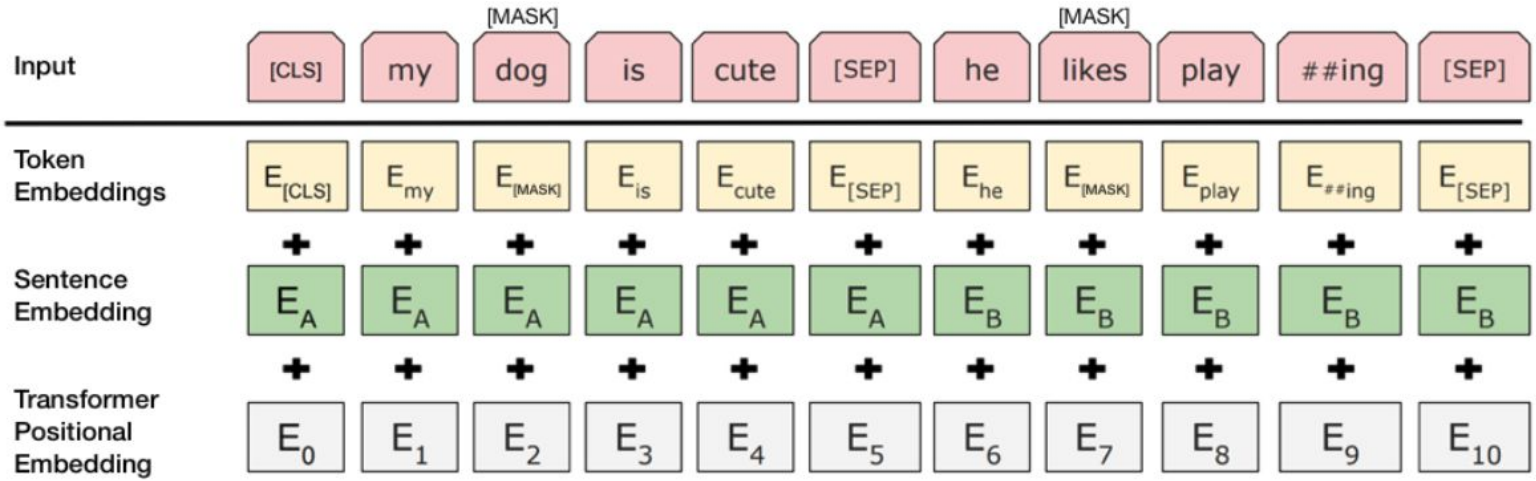
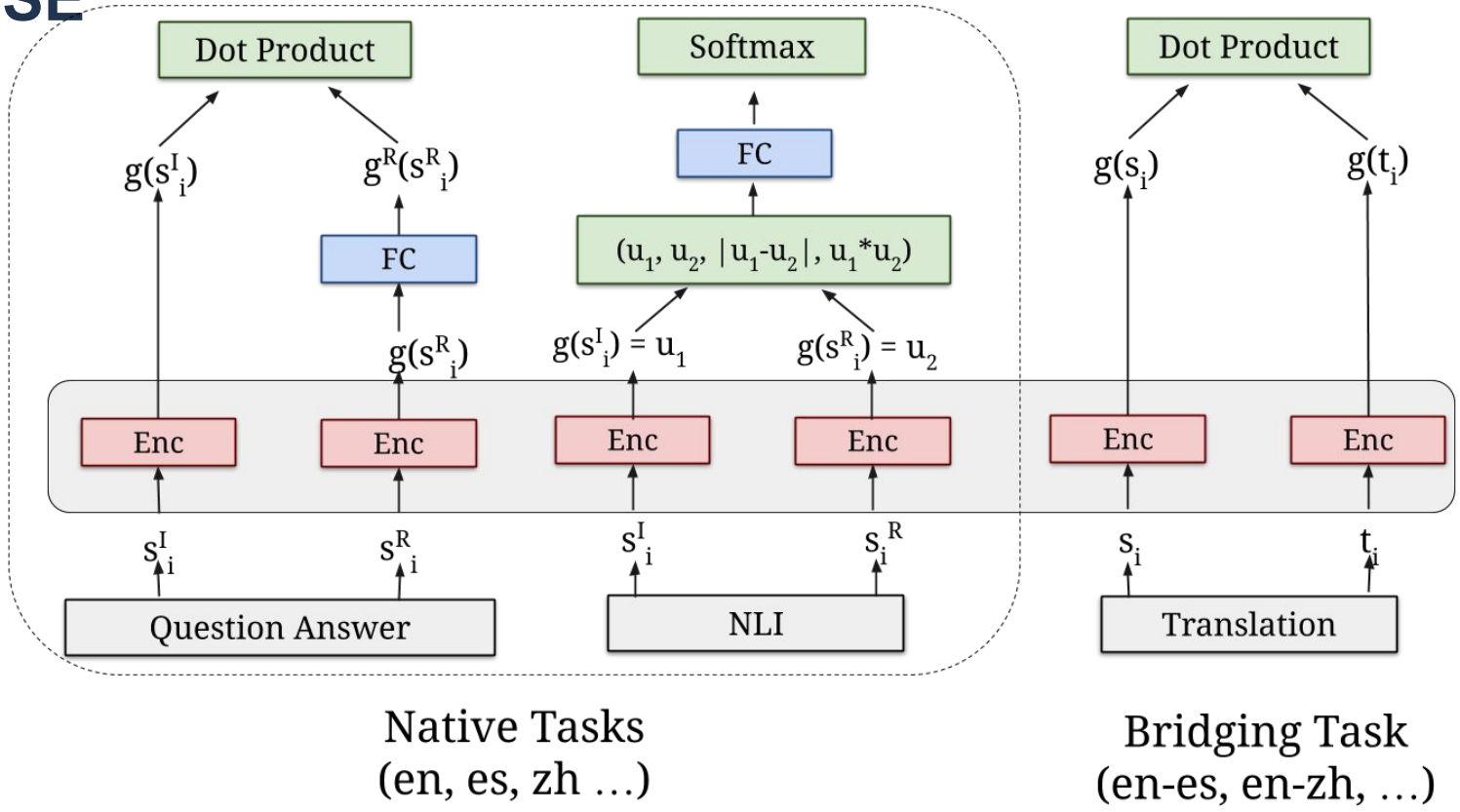


Illustration by Arunabh Ghosh

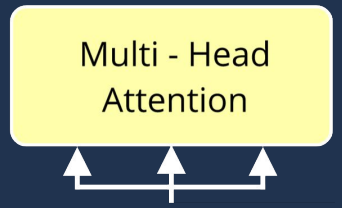
Bert


Input
[CLS] my [MASK] dog is cute [SEP] he [MASK] likes play ##ing [SEP]
Token Embeddings
E[CLS] Emy E[MASK] Eis Ecute E[SEP] Ehe E[MASK] Eplay E##ing E[SEP]
Sentence Embedding
EA EA EA EA EA EA EB EB EB EB EB
Transformer Positional Embedding
E0 E1 E2 E3 E4 E5 E6 E7 E8 E9 E10

USE


Dot Product
Softmax
Dot Product
g(s^I_i)
g^R(s^R_i)
FC
FC
g(s_i)
g(t_i)
(u_1, u_2, |u_1-u_2|, u_1*u_2)
g(s^R_i)
g(s^I_i) = u_1
g(s^R_i) = u_2
Enc
Enc
Enc
Enc
Enc
Enc
s^I_i
s^R_i
s^I_i
s_i^R
s_i
t_i
Question Answer
NLI
Translation
Native Tasks
(en, es, zh …)
Bridging Task
(en-es, en-zh, …)

Thanks for your



Speaker

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senti one