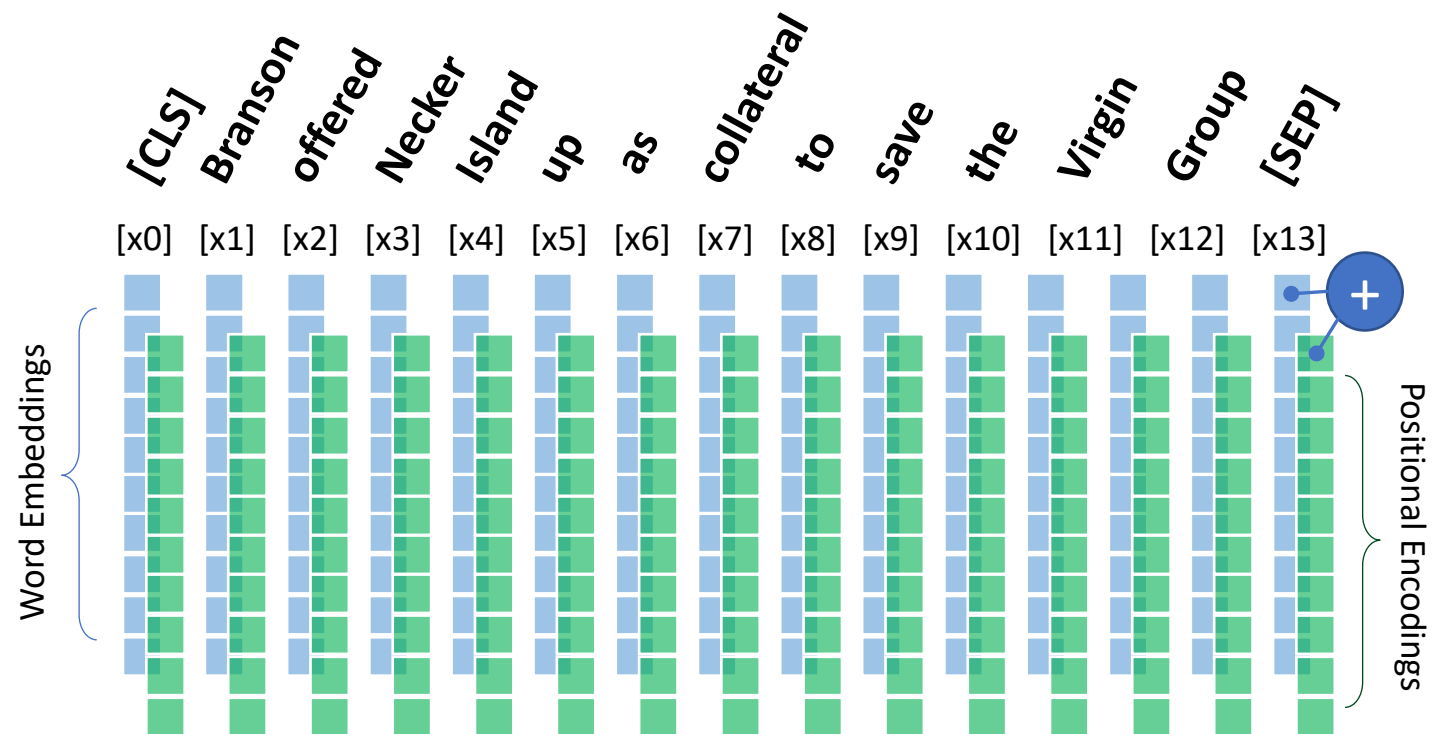
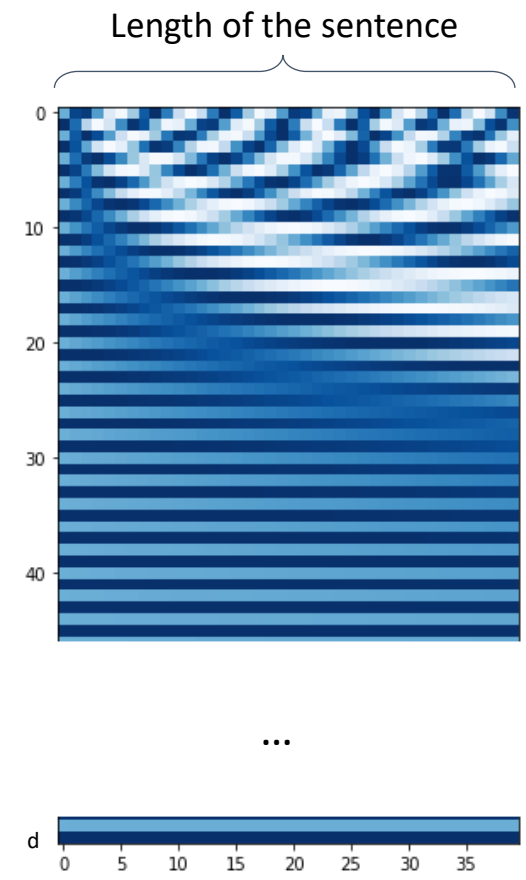
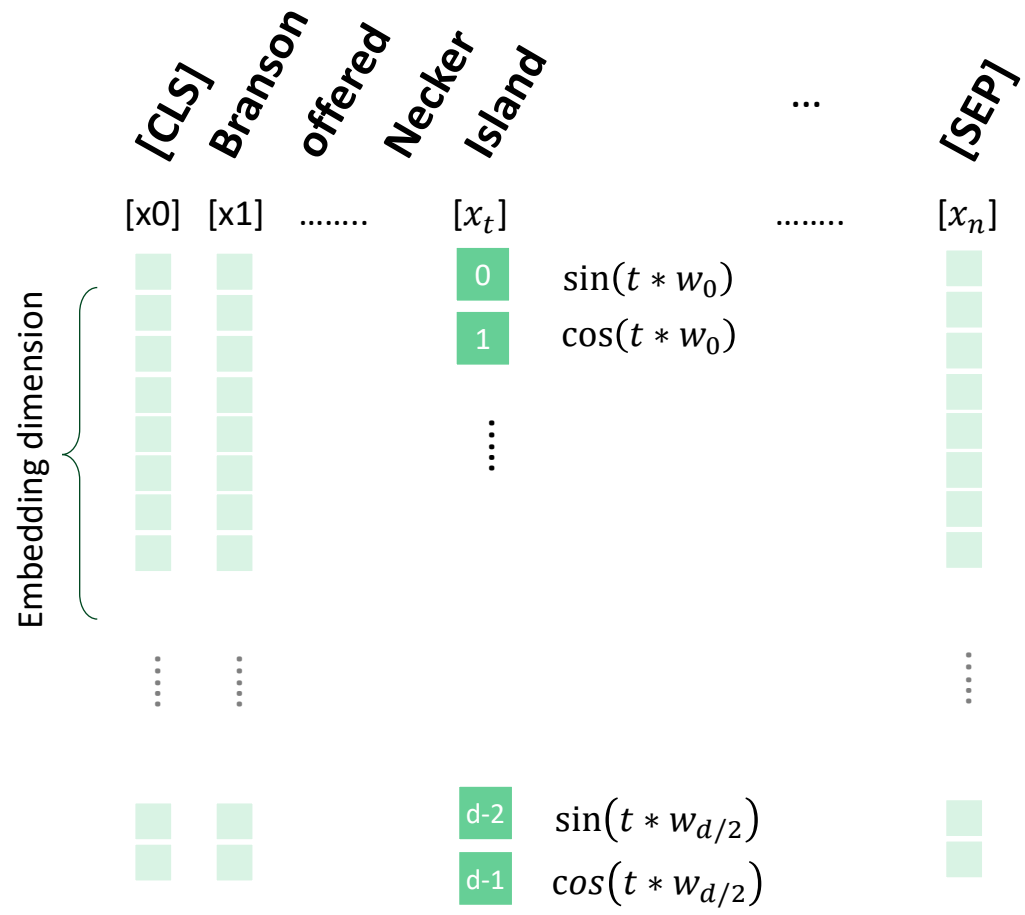


[CLS] Branson offered Necker Island up as collateral to save the Virgin Group [SEP]



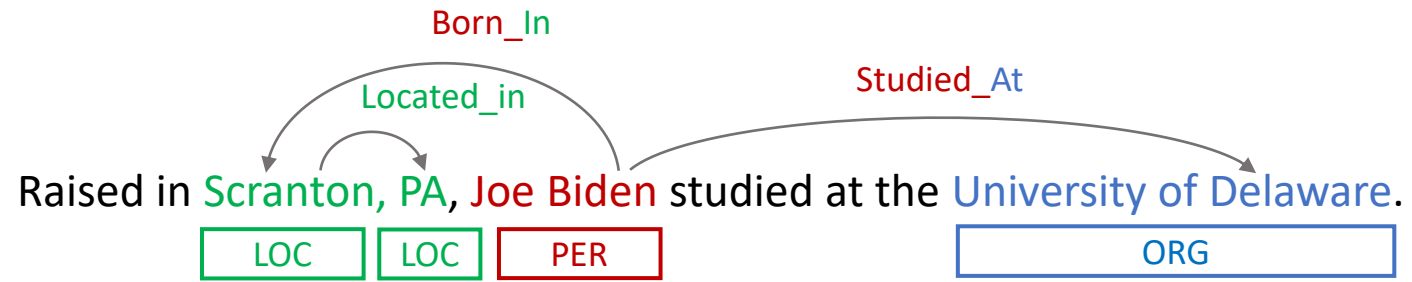


In 1976 , Brian Kernighan published Software Tools , the first of his books .

[CLS] [x1] [x2] [e1_start] [BLANK] [e1_end] [x6] [e2_start] [BLANK] [e2_end] [x10] [x11] [x12] [x13] [x14] [SEP]

[CLS] [x1] [x2] [e1_start] [x3] [x4] [e1_end] [x6] [e2_start] [x7] [x8] [e2_end] [x9] [x10] [x11] [x12] [x13] [SEP]



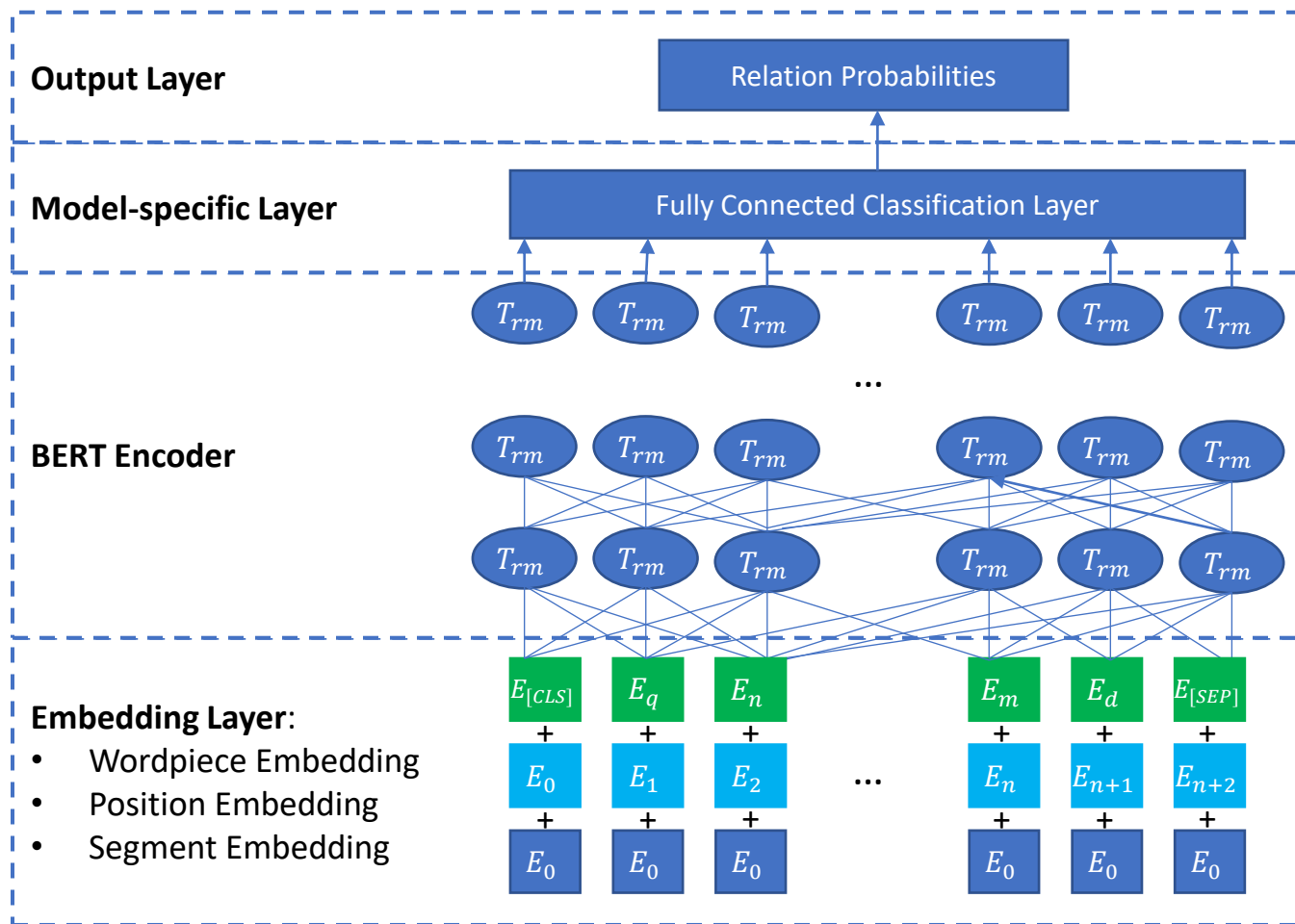


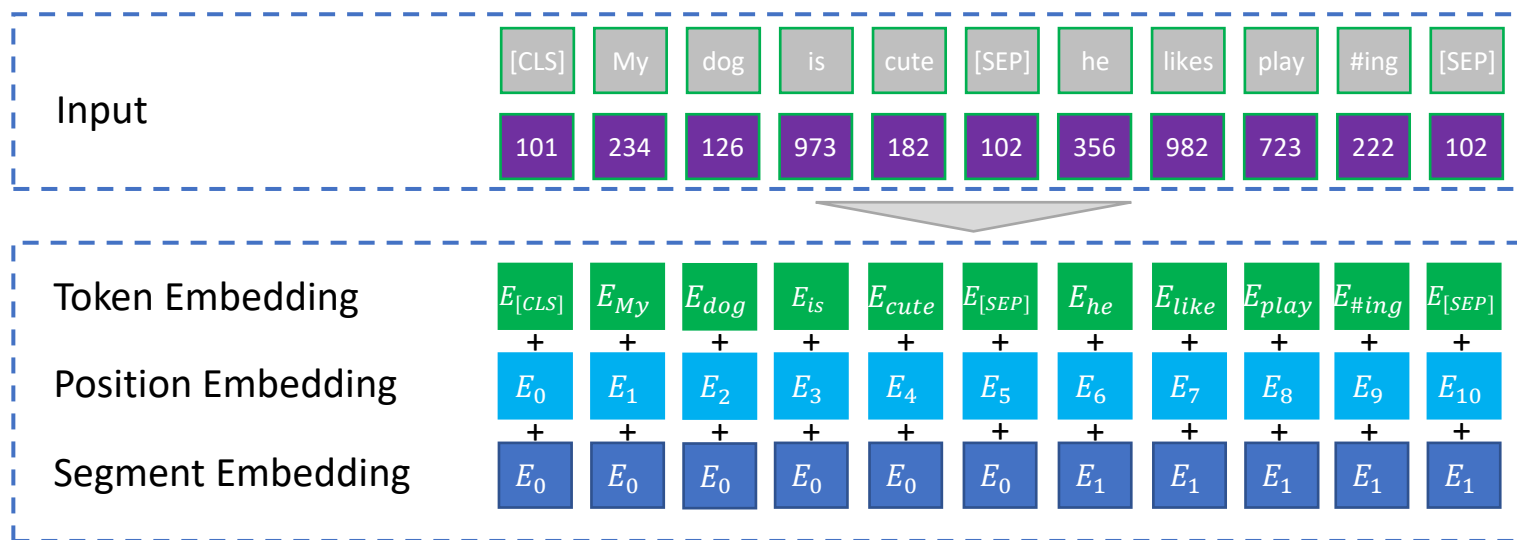
$$-\frac{1}{|D|^2} \sum_{(r,e_1,e_2) \in D} \sum_{(r,e_1,e_2) \in D} \delta_{e_1,e'_1} \delta_{e_2,e'_2} \log p(l=1|r,r') + (1 - \delta_{e_1,e'_1} \delta_{e_2,e'_2}) * \log(1 - p(l=1|r,r'))$$

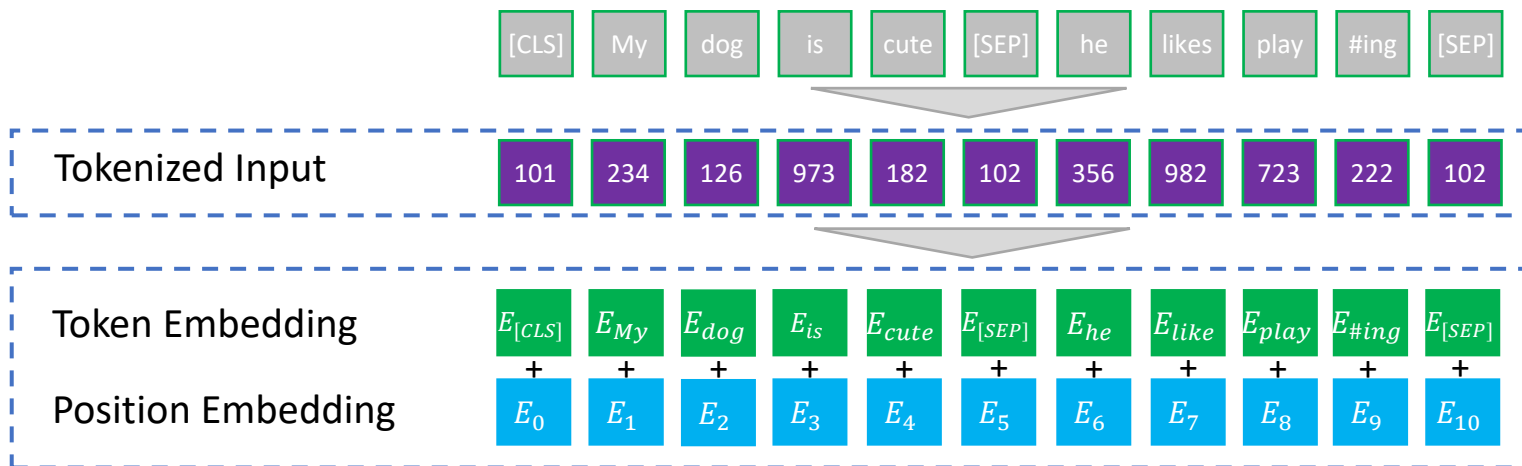
[CLS] [S-PER] was born in [O-LOC] [SEP] Obama [SEP] Honolulu [SEP]

[CLS] \$ Barack Obama \$ was born in # Honolulu # [SEP]

[CLS] [$E1_{start}$] Barack Obama [$E1_{end}$] was born in [$E2_{start}$] Honolulu [$E2_{end}$] [SEP]





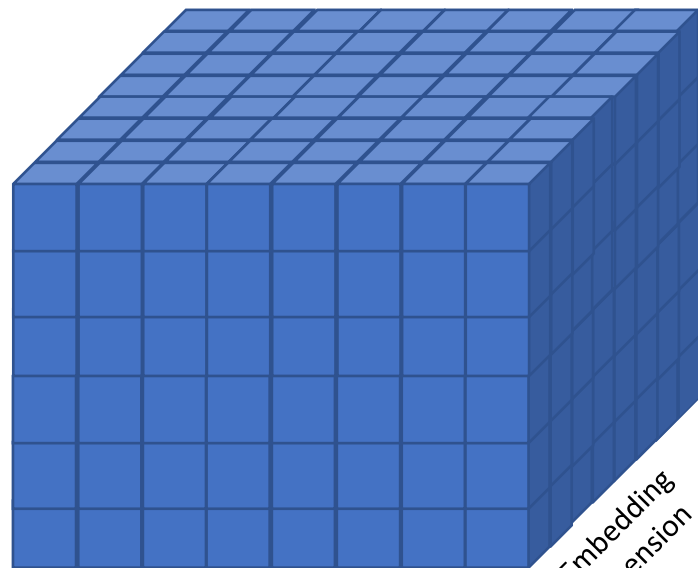


Batch of N tokenized sentences

1.	101	821	344	724	0
2.	101	312	225	912	0
3.	101	521	662	123	0
...					
N.	101	923	344	711	0

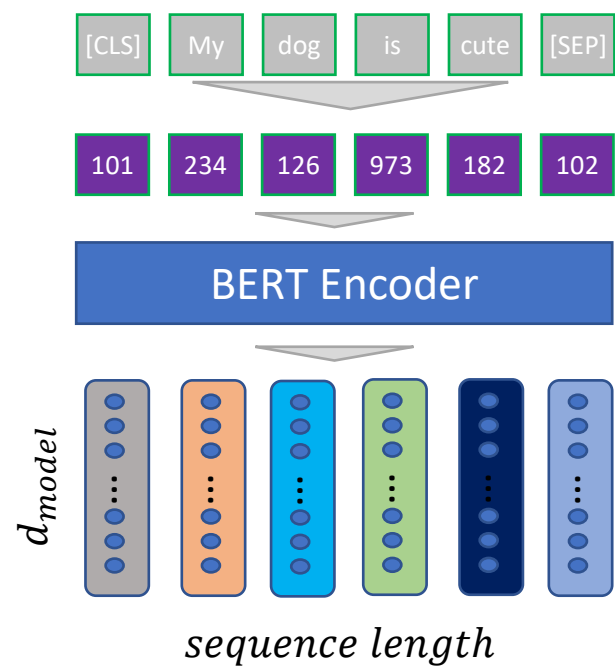
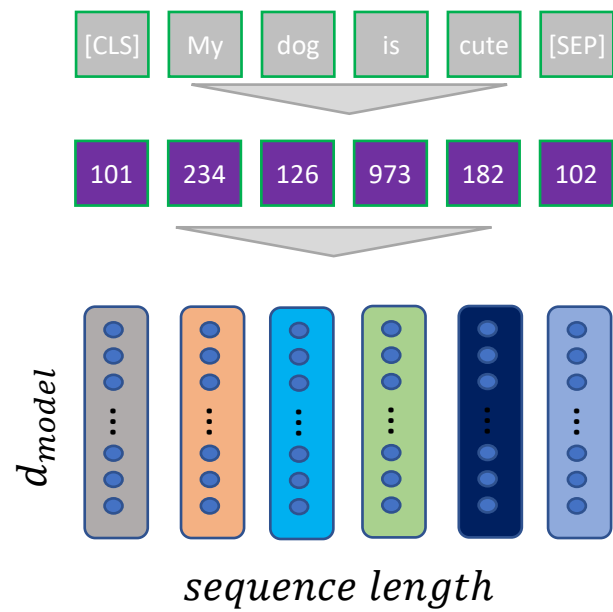


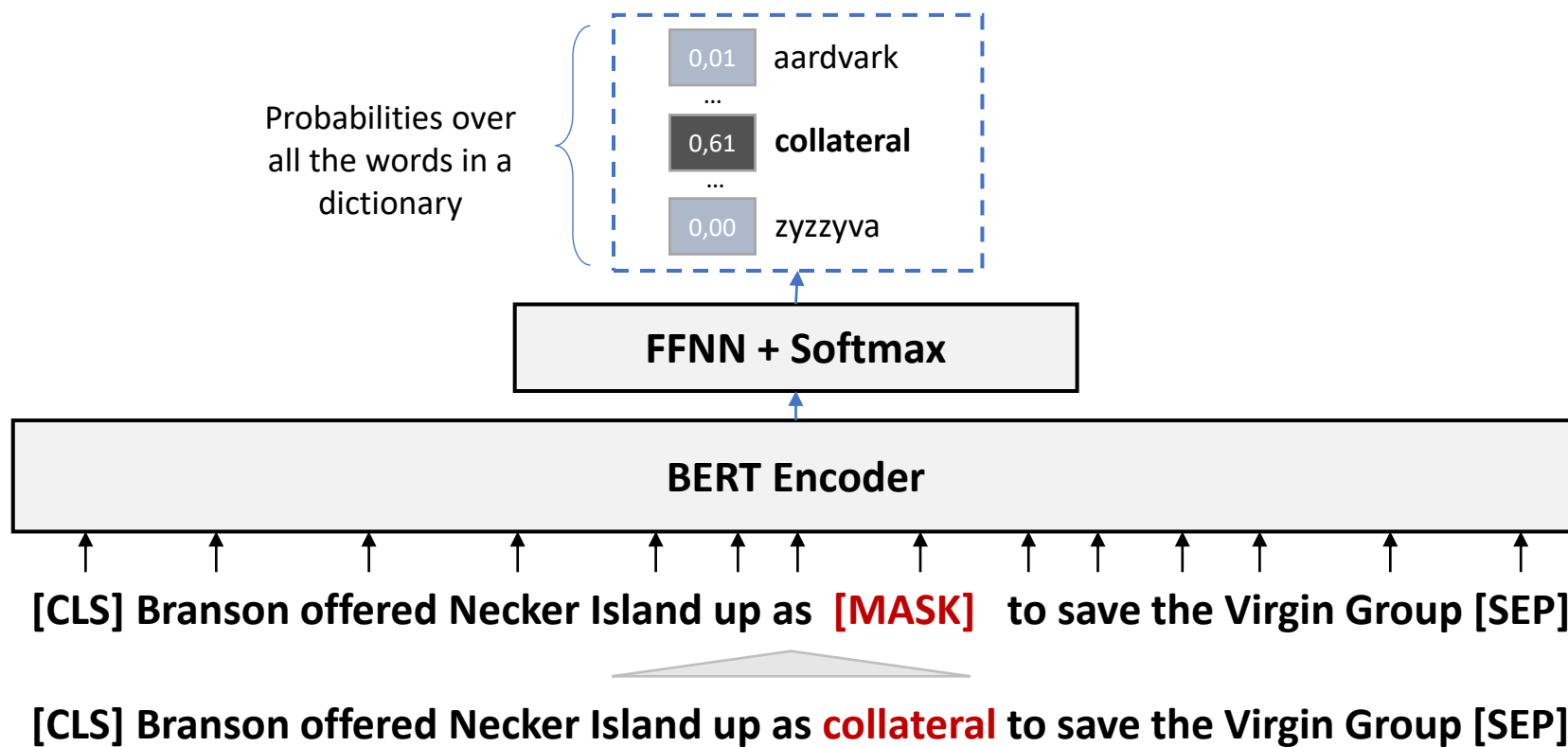
Batch size



Sequence length

Embedding
dimension





Vostok 6 was the first human spaceflight to carry a woman, cosmonaut Valentina Tereshkova.



First woman in space, Valentina Tereshkova, flew Vostok 6.



Valentina Tereshkova started with the rank of private in the Soviet Air Forces.



In 1997, Jeff Buckley moved to Memphis, to resume work on the album



Vostok 6 was the first human spaceflight to carry a woman, cosmonaut Valentina Tereshkova.



First woman in space, Valentina Tereshkova, flew Vostok 6.



Valentina Tereshkova started with the rank of private in the Soviet Air Forces.

PERV

ORG

LOC

LOC

Richard Kahn officer for the American Diabetes Association in Alexandria, Va

0

1

2

3

4

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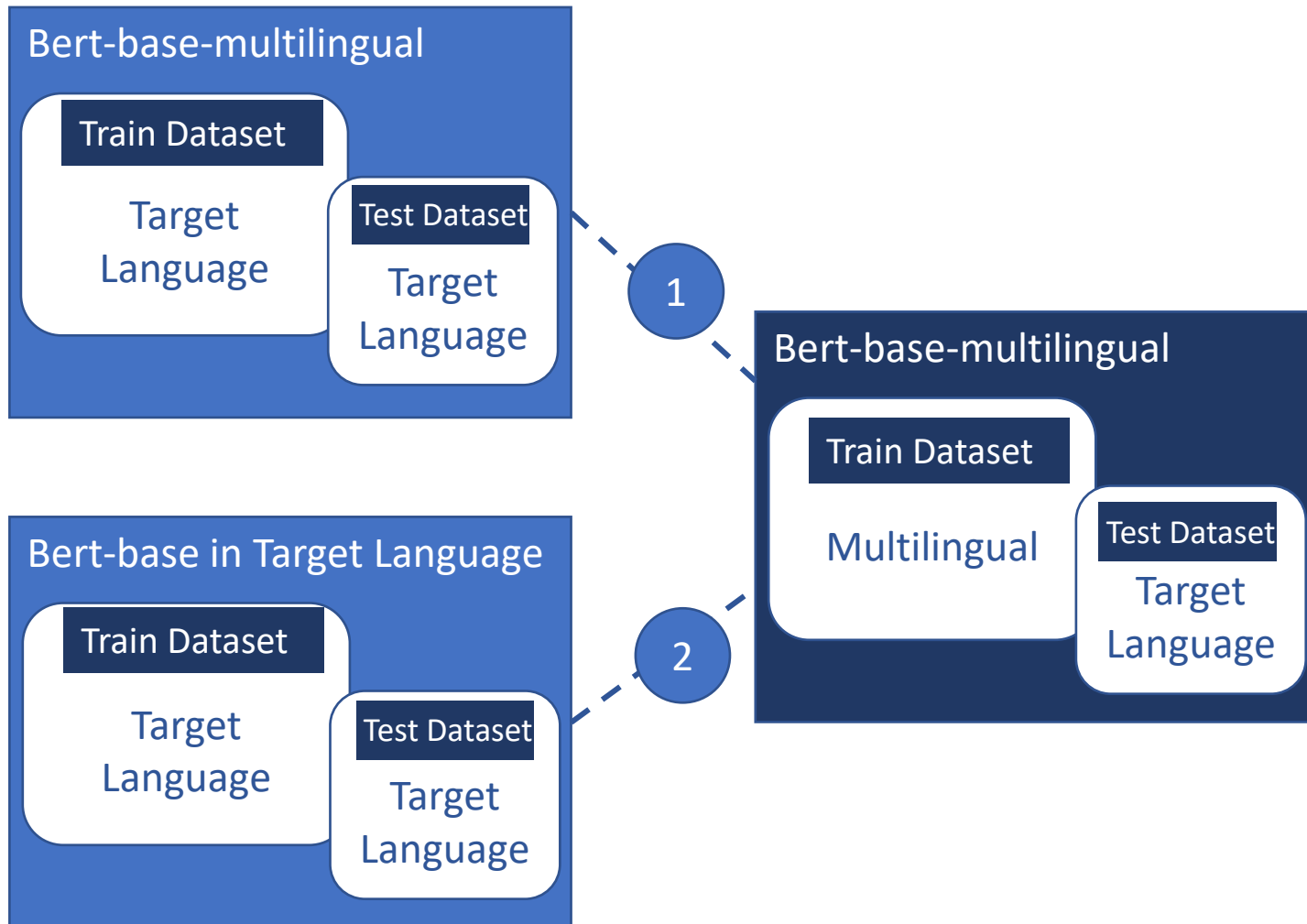
10



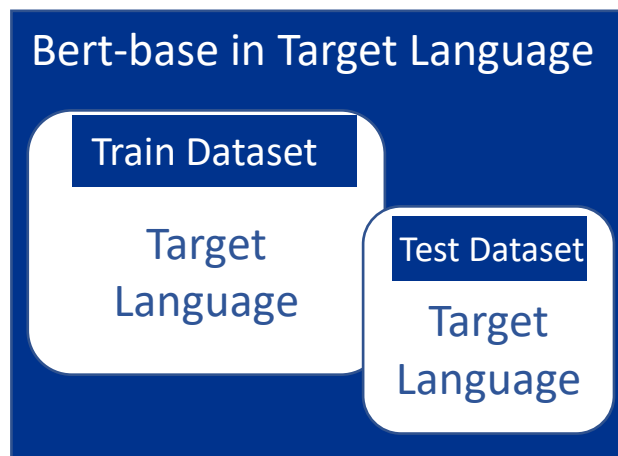
x	823 123 4325 103 105 674 982 192 120 878 999
$(e1_{start}, e1_{end})$	(0, 2)
$(e2_{start}, e2_{end})$	(5, 8)
$e1$	823 123
$e2$	674 982 192

x	823 123 4325 103 105 674 982 192 120 878 999
$(e1_{start}, e1_{end})$	(5, 8)
$(e2_{start}, e2_{end})$	(9, 10)
$e1$	674 982 192
$e2$	878

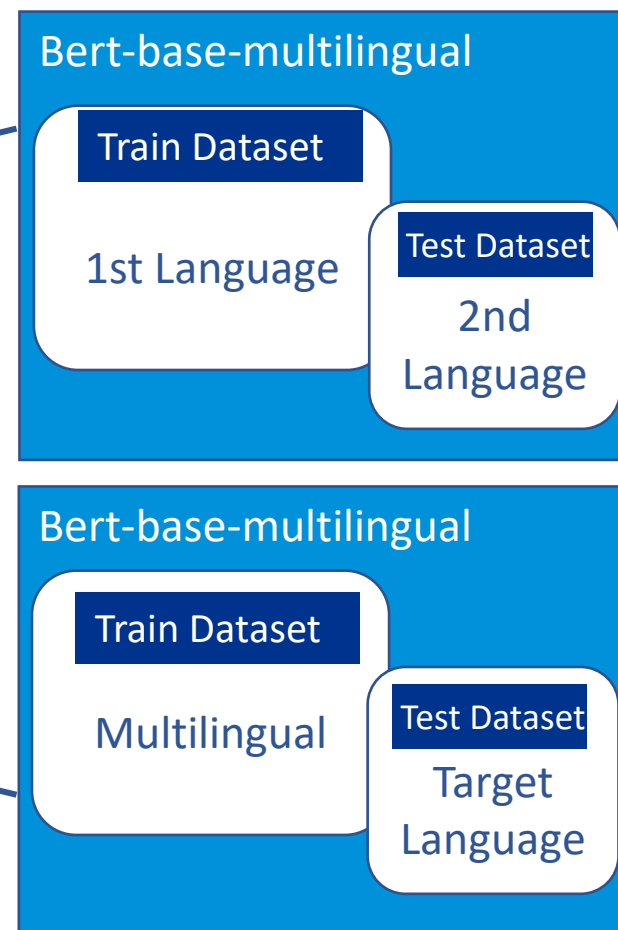
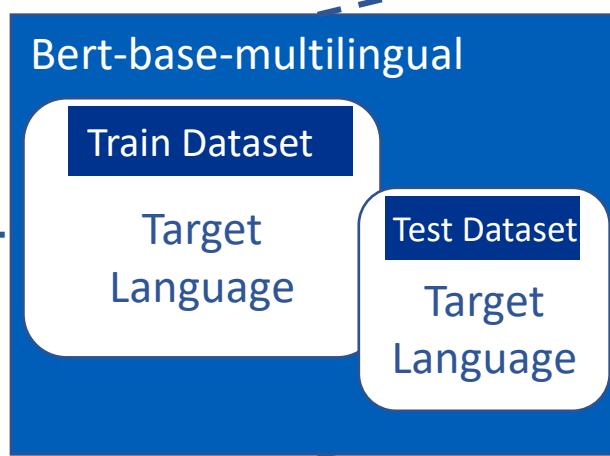
...

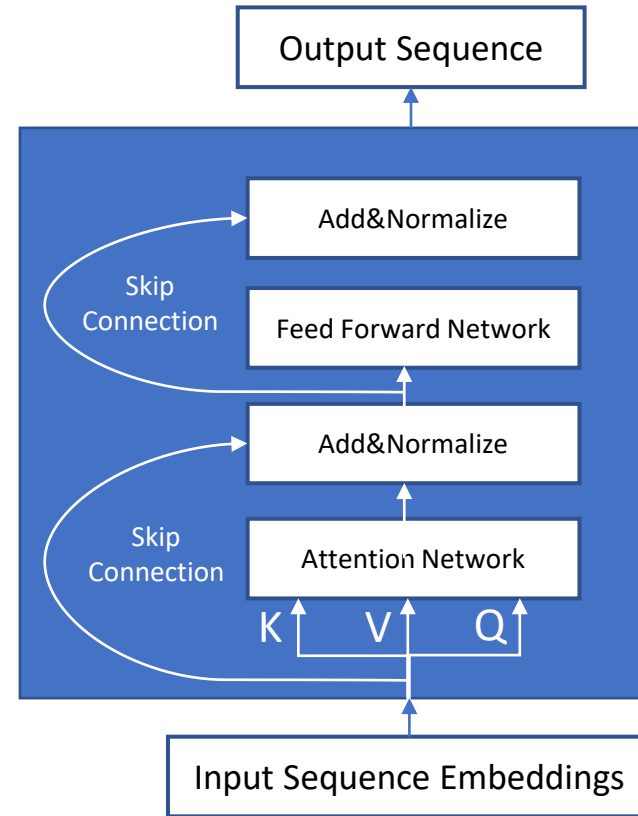


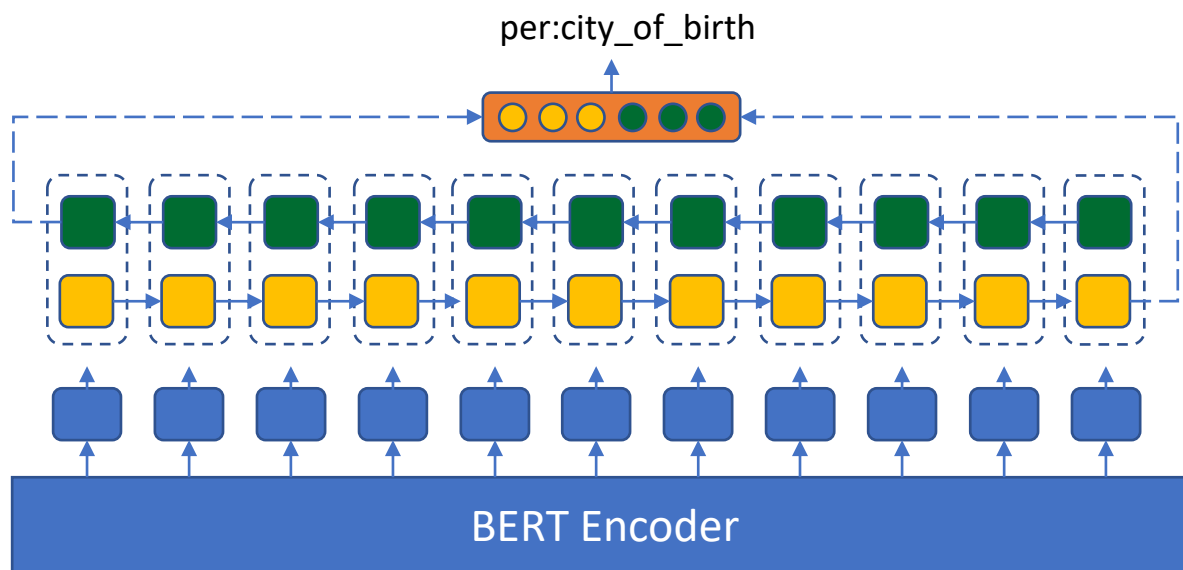
Monolingual Benchmark



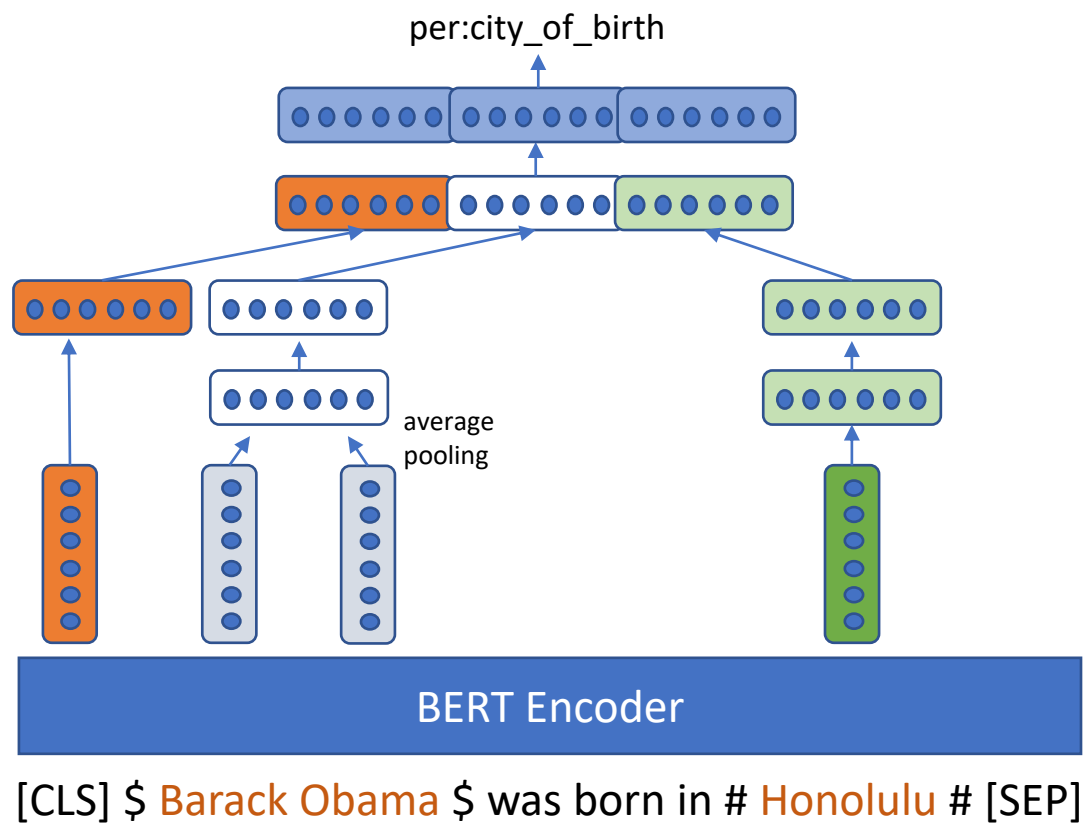
Multilingual Models

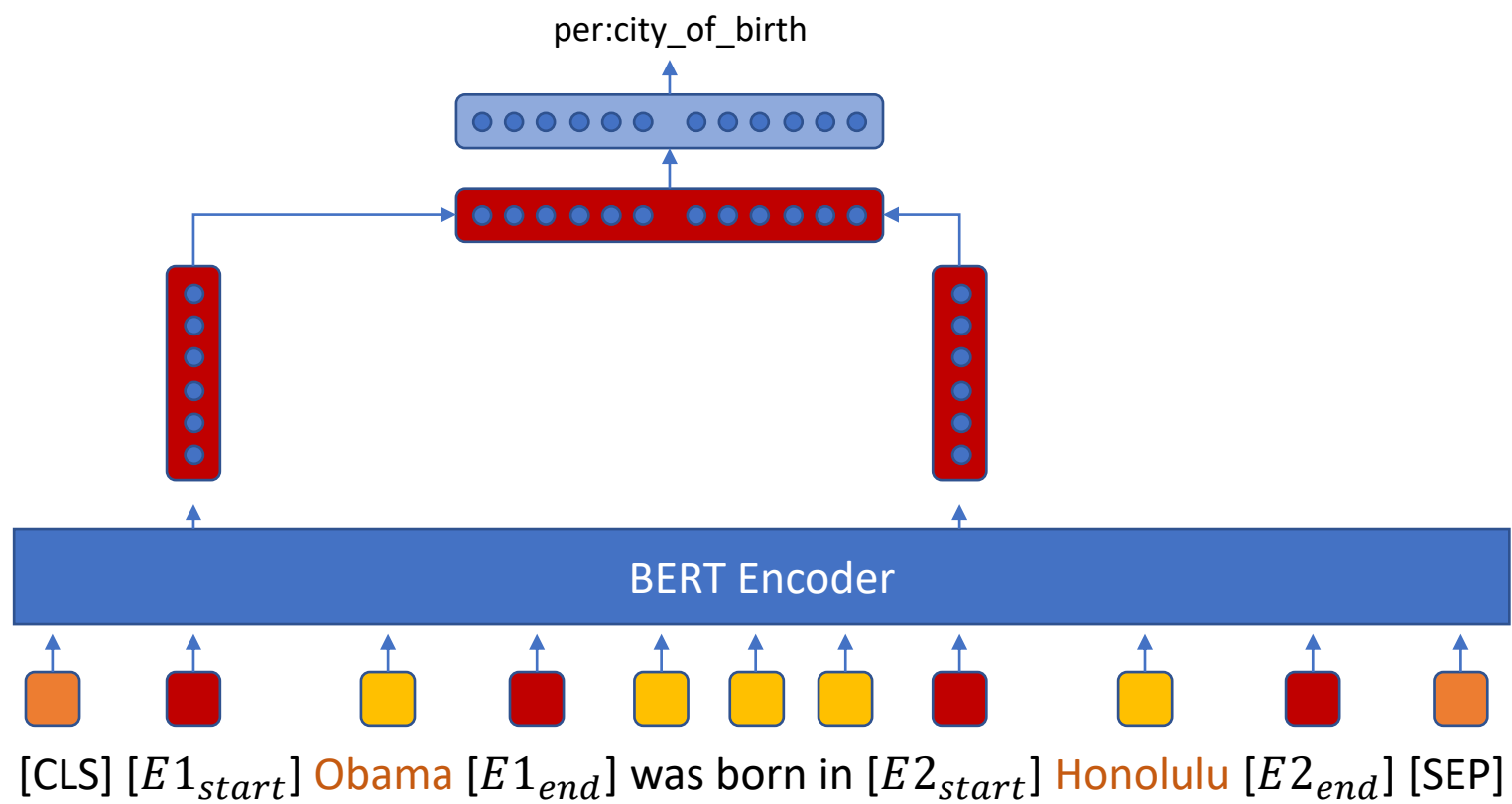






[CLS] [S-PER] was born in [O-LOC] [SEP] Obama [SEP] Honolulu [SEP]





Tim Cook is Apple's current CEO



Founder 0.05

CEO 0.89

⋮

Place of Birth 0.01

Original
Example

The girl showed a photo of **apple** **<e1>tree</e1>** **<e2>blossom</e2>** on a fruit tree in the Central Valley.

Translation:
entity tags

Das Mädchen zeigte ein Foto von **Apfel** **<e1>Baum</e1>** **<e2>Blüte</e2>** an einem Obstbaum im Zentraltal.

Translation:
no entity
tags

Das Mädchen zeigte ein Foto der **Apfelbaumblüte** an einem Obstbaum im Zentraltal

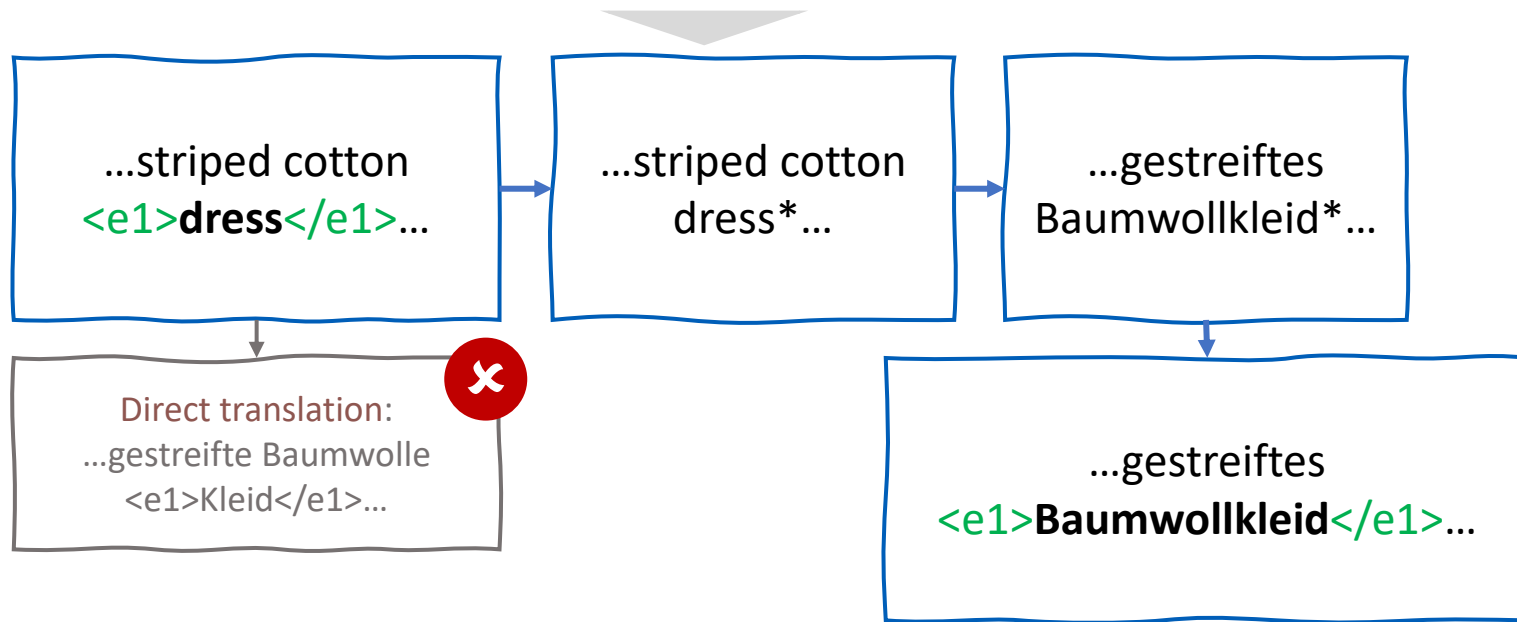
English

We are careful when mowing a meadow, as a **<e1>nide</e1>** of **<e2>pheasants</e2>** is in the tall grasses, brooding their young.

German

Wir sind vorsichtig, wenn wir eine Wiese mähen, denn in den hohen Gräsern brüten **Fasane**, die ihre Jungen zur Welt bringen.

*This cut blue and white striped cotton **<e1>dress</e1>** with red bands on the bodice was in a **<e2>trunk</e2>** of vintage Barbie clothing.*



*"Dieses geschnittene blau-weiß gestreifte **<e1> Baumwollkleid </e1>** mit roten Bändern am Mieder befand sich in einem **<e2>Koffer </e2>** mit Vintage-Barbie-Kleidung.*



U.S. citizens traveling to **Germany** from the **United States** will not be permitted to enter ...

Germany and the **United States** are bound by a close friendship based on historical ties

The embassy is the official representation of the Federal Government of **Germany** in the **United States**

