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A deep Natural Language Inference predictor in Italian without Italian training data

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NLI: logical implication between sentence pairs

Premise (Fact)	Hypothesis (Insight)	Label
A soccer game with multiple males playing	Some men are playing a sport	**ENTAILMENT**
An older and younger man smiling	Two men are smiling and laughing at the cats playing on the floor	**NEUTRAL**
A man inspects the uniform of a figure in some East Asian country	The man is sleeping	**CONTRADICTION**

SNLI dataset credits:

If the hypothesis is inferred from the premise, we may employ **hypothesis** as a **query** for free-text.

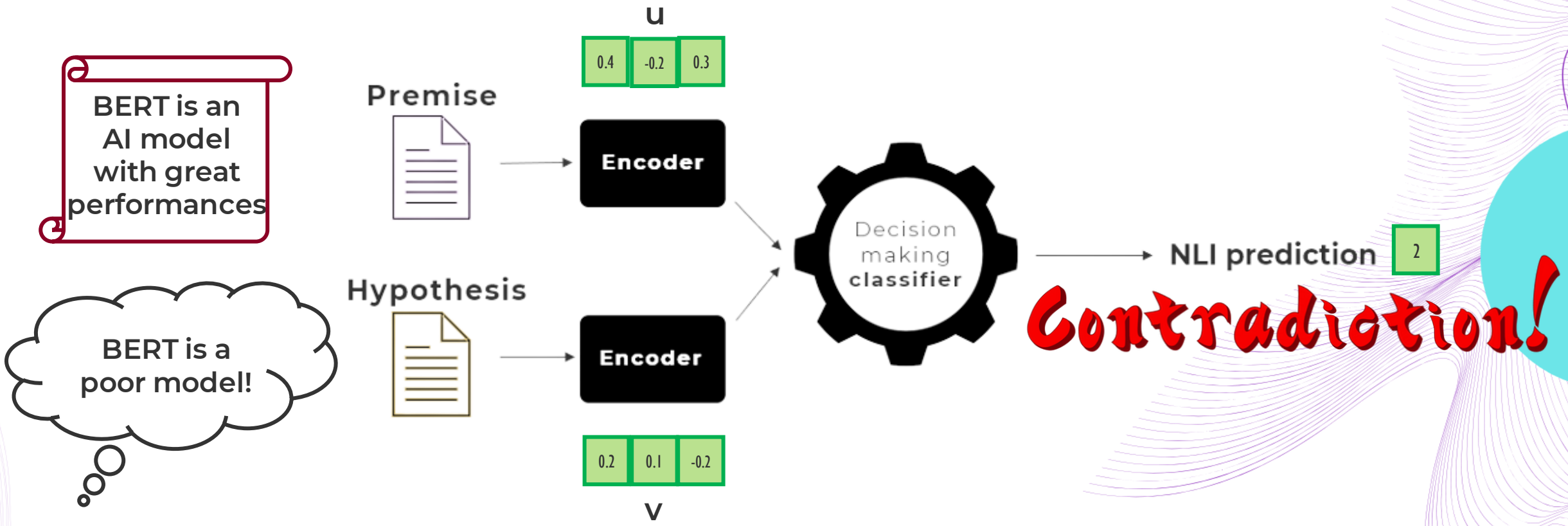
The challenge is the absence of language-specific training data

- Our method has **NLI** capability **without labelled data** in that language
- We can perform **unsupervised extraction** from free-text

Review (credits: G)	Query for custom info	Label
Un po' fuori mano, proprio come il nome. Però è un bel locale. Cibo normale, e prezzi un po' alti.	Prezzo alto	**ENTAILMENT**
	Prezzo basso	**CONTRADICTION**

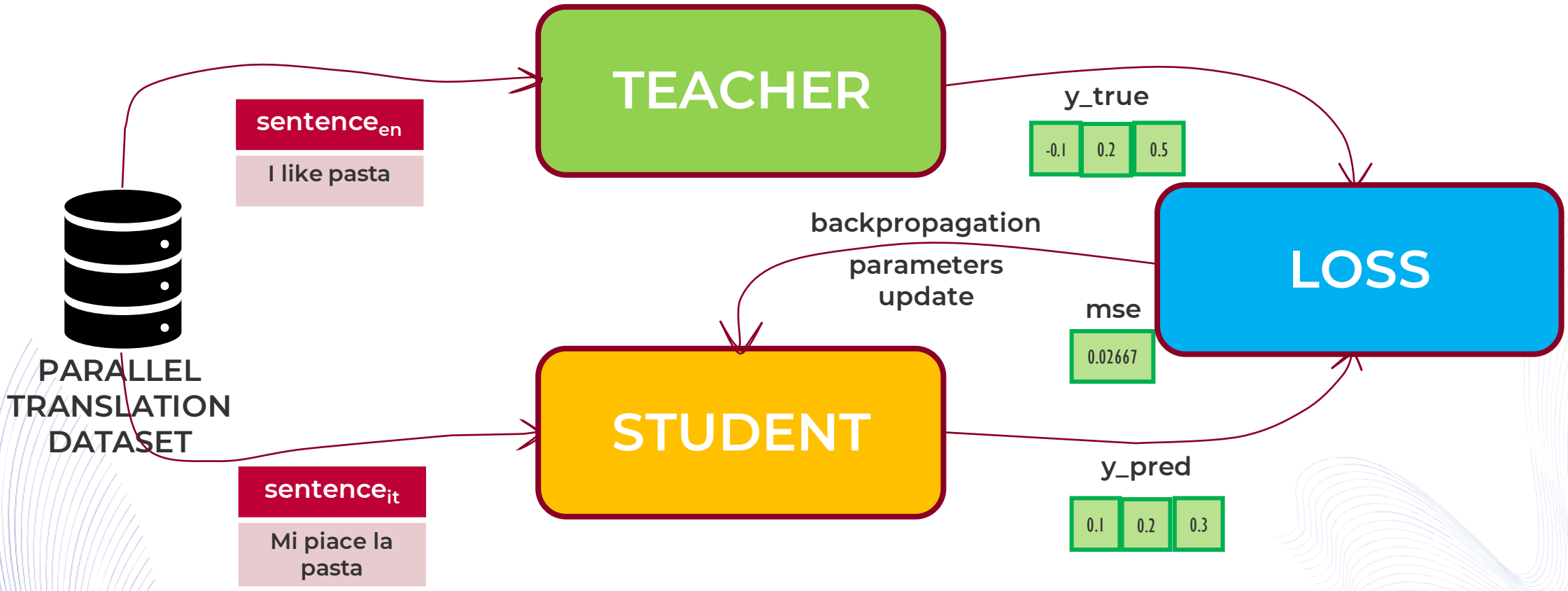
Goal: **generalize** a NLI classifier in a language with **no NLI datasets**.

We started our work by building an English NLI model



We need a strategy to **address Italian language**!

We used Knowledge Distillation to address Italian language



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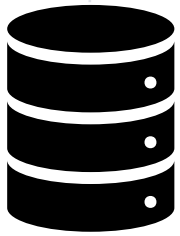

PARALLEL TRANSLATION DATASET

$sentence_{en}$	$sentence_{it}$
I like pasta	Mi piace la pasta

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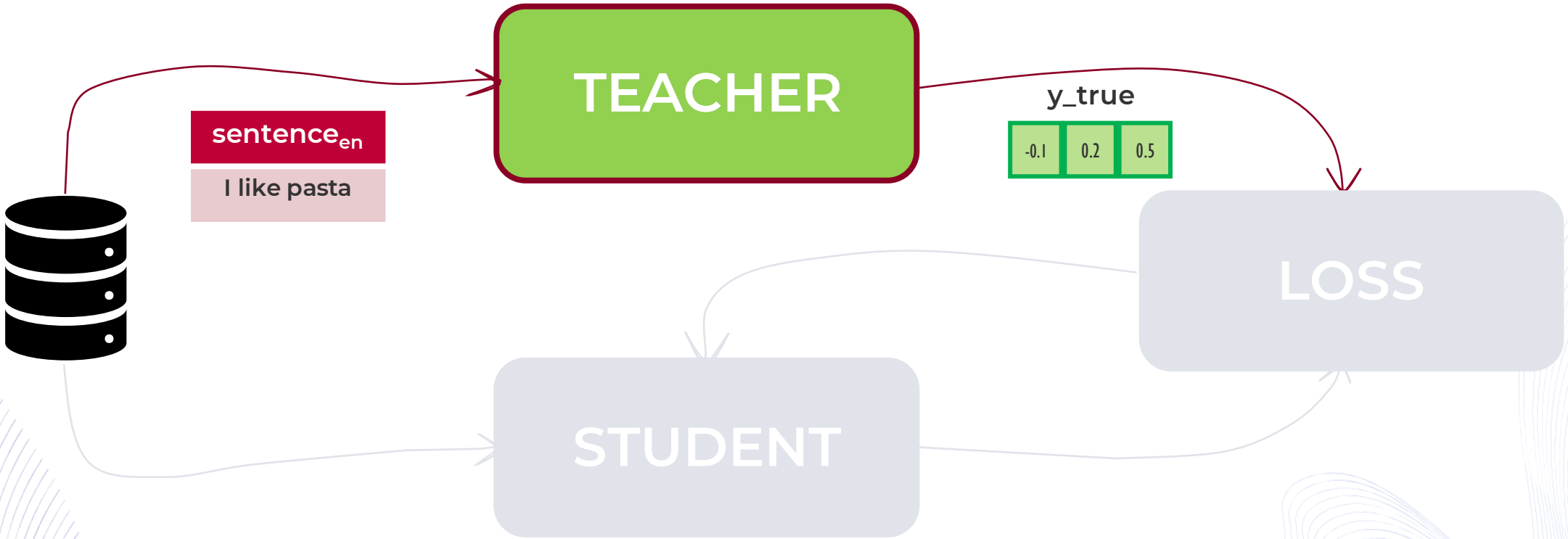

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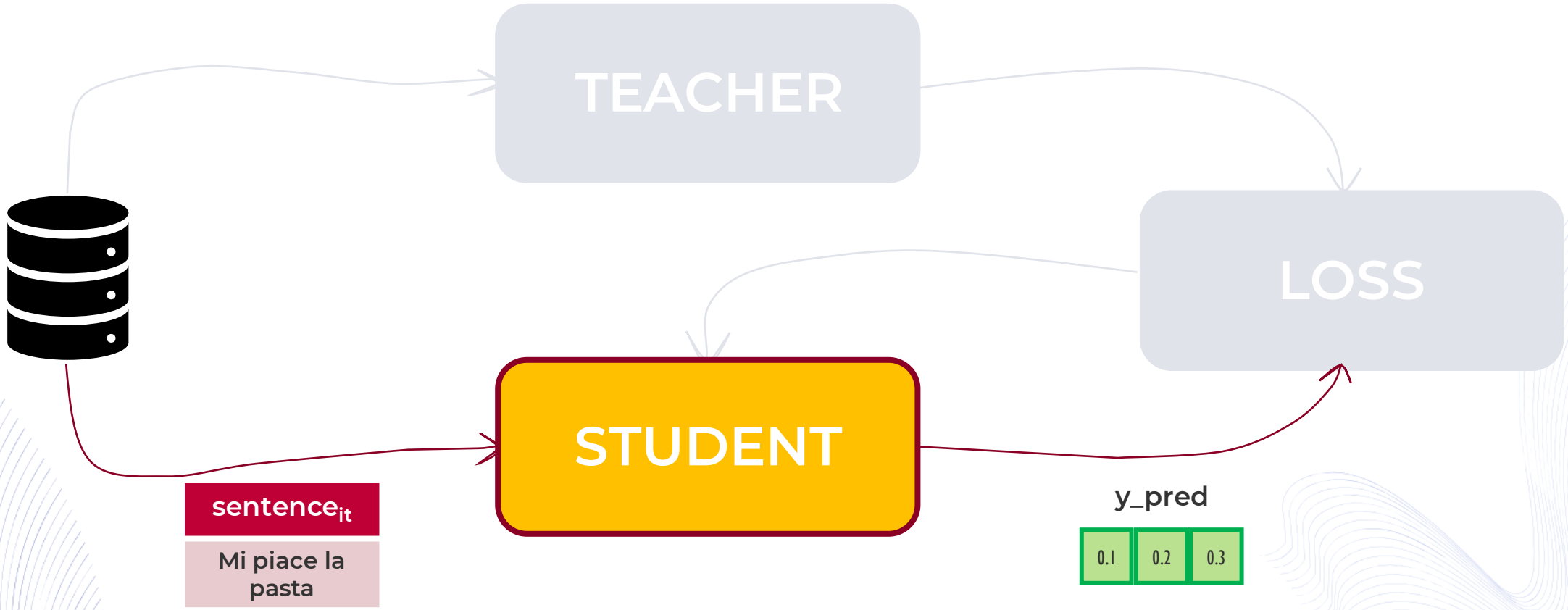

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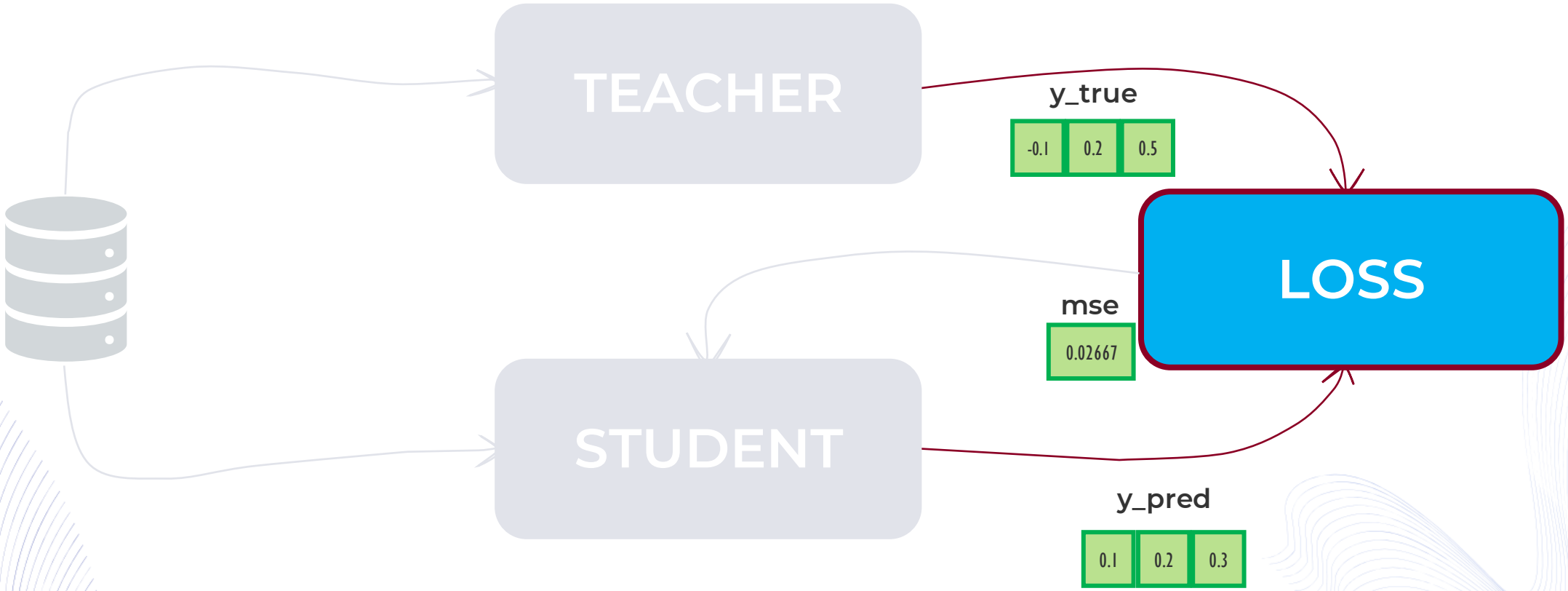

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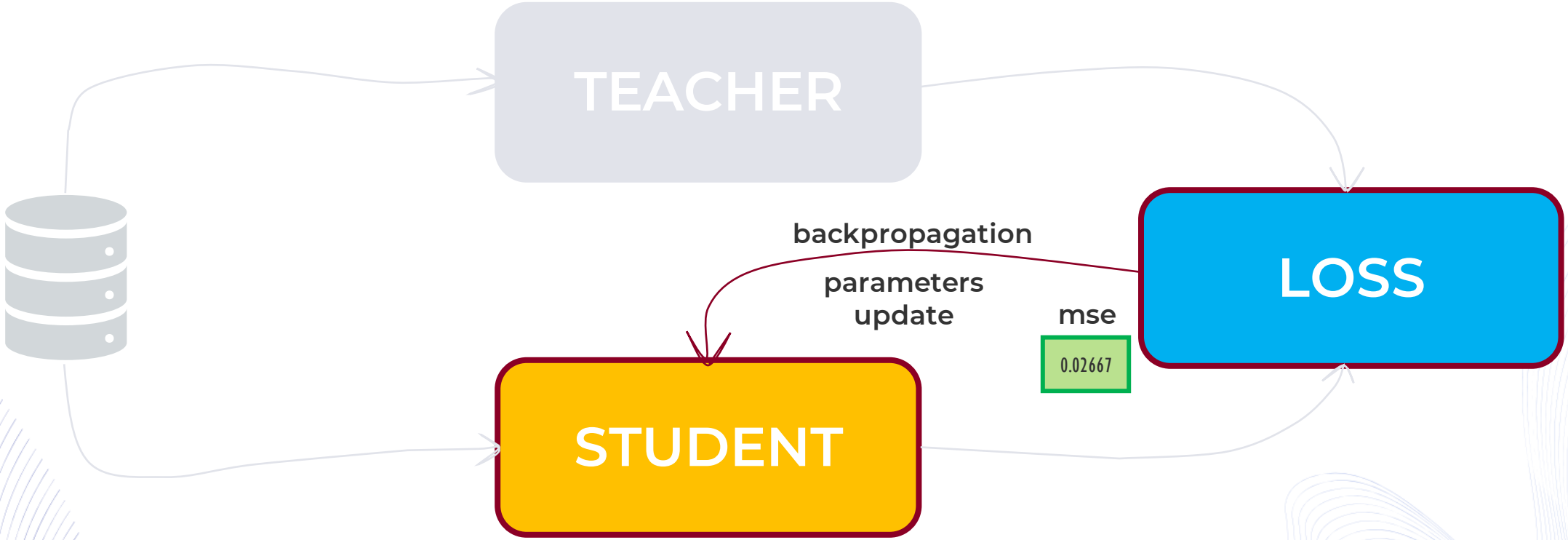

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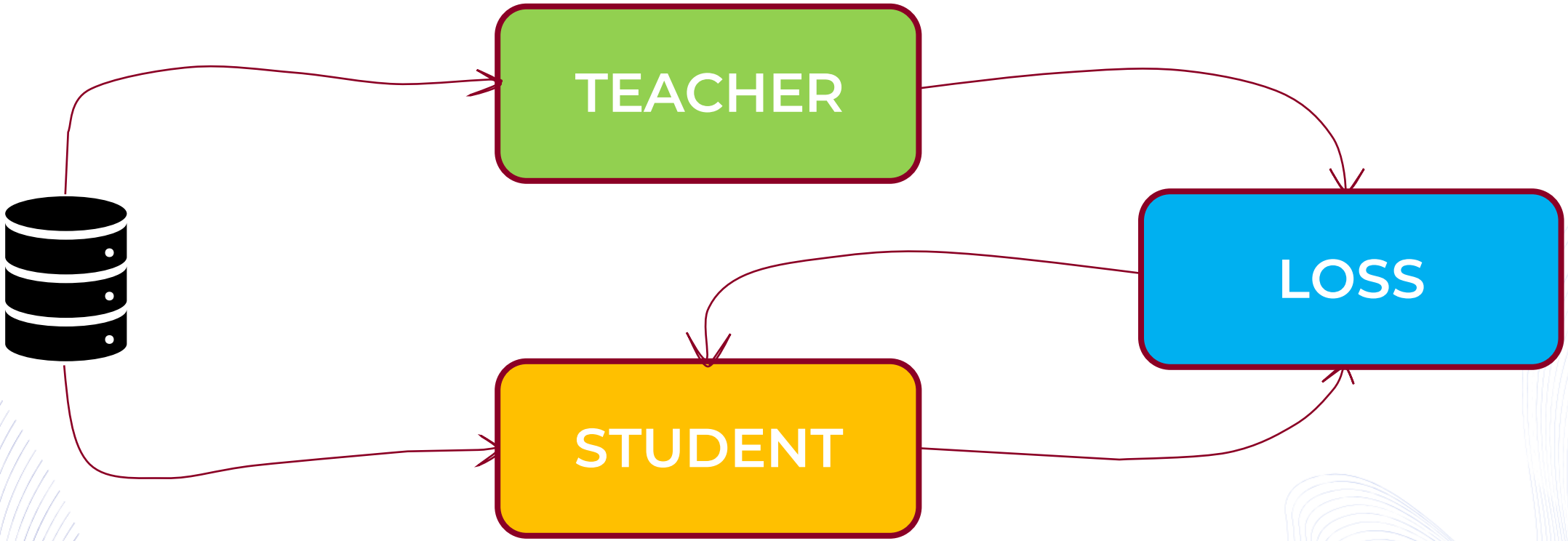

Sentences with the same semantics are mapped the same **regardless of the language**.

Tests over translated SNLI, MNLI and RTE

Dataset	Task	Metric	Result	Delta*
SNLI (IT) translated w/**NLLB**	NLI	Accuracy	**74.21%**	-1.83%
SNLI (IT) translated w/**NLLB**	NLI	Min F1-Score	**67.19%**	-4.34%
MNLI (IT) translated w/**NLLB**	NLI	Accuracy	**72.74%**	**+1.09%**
MNLI (IT) translated w/**NLLB**	NLI	Min F1-Score	**64.53%**	**+0.55%**

Dataset	Task	Metric	Result	Delta
RTE3-ITA	NLI	Accuracy	**67.50%**	**+4.75%**
RTE3-ITA	NLI	Min F1-Score	**60.12%**	**+5.55%**

*Delta: performance difference of Knowledge Distillation with another architecture based on Machine Translation.

The architecture **performs better** than fine-tuning over NLI machine-translated dataset.

ABSA problem can be ‘mapped’ into a NLI task

Premise	Hypothesis	Task	Expected label
Camera piccola ma pulita	Sono soddisfatto	SA	**ENTAILMENT**
	Parlo di pulizia	TR	**ENTAILMENT**
	La camera è pulita	ABSA	**ENTAILMENT**

Neutral label remapped by means of **validation set performance maximization**:

Model label	Task	Dataset label
NEUTRAL	SA	**ENTAILMENT (TRUE)**
	TR	**ENTAILMENT (TRUE)**
	ABSA	**CONTRADICTION (FALSE)**

By choosing **ad-hoc hypotheses**, we can search for information from free-text!

ABSA problem can be ‘mapped’ into a NLI task

Dataset	Balancing	Task	Metric	Result	Delta
ABSITA	1:1	**SA**	Accuracy	**85.04%**	**+3.08%**
ABSITA	1:1	**TR**	Accuracy	**71.19%**	-3.10%
ABSITA	**1:7**	**TR**	Accuracy	**65.84%**	**+6.24%**
ABSITA	1:1	**ABSA**	Accuracy	**94.03%**	**+6.24%**
ABSITA	**1:15**	**ABSA**	Accuracy	**78.42%**	**+11.39%**

*Delta: performance difference of Knowledge Distillation with another architecture based on Machine Translation.

NLI seems to work well to find patterns in free-text!

Recap and conclusions

- We identified an approach to **classify free-text** in an unsupervised way using NLI
- We proved **generality of NLI task** by emulating SA, TR, and ABSA
- Surprisingly, **KD** model revealed to be successful

Cheers from BERT!

credits:

- We identified an approach to **classify free-text** in an unsupervised way using NLI
- We proved **generality of NLI task** by emulating SA, TR, and ABSA
- Surprisingly, **KD** model revealed to be successful

Thank you very much for the attention!

Lorenzo Corradi