

# Natural Language Processing

Trends in NLP



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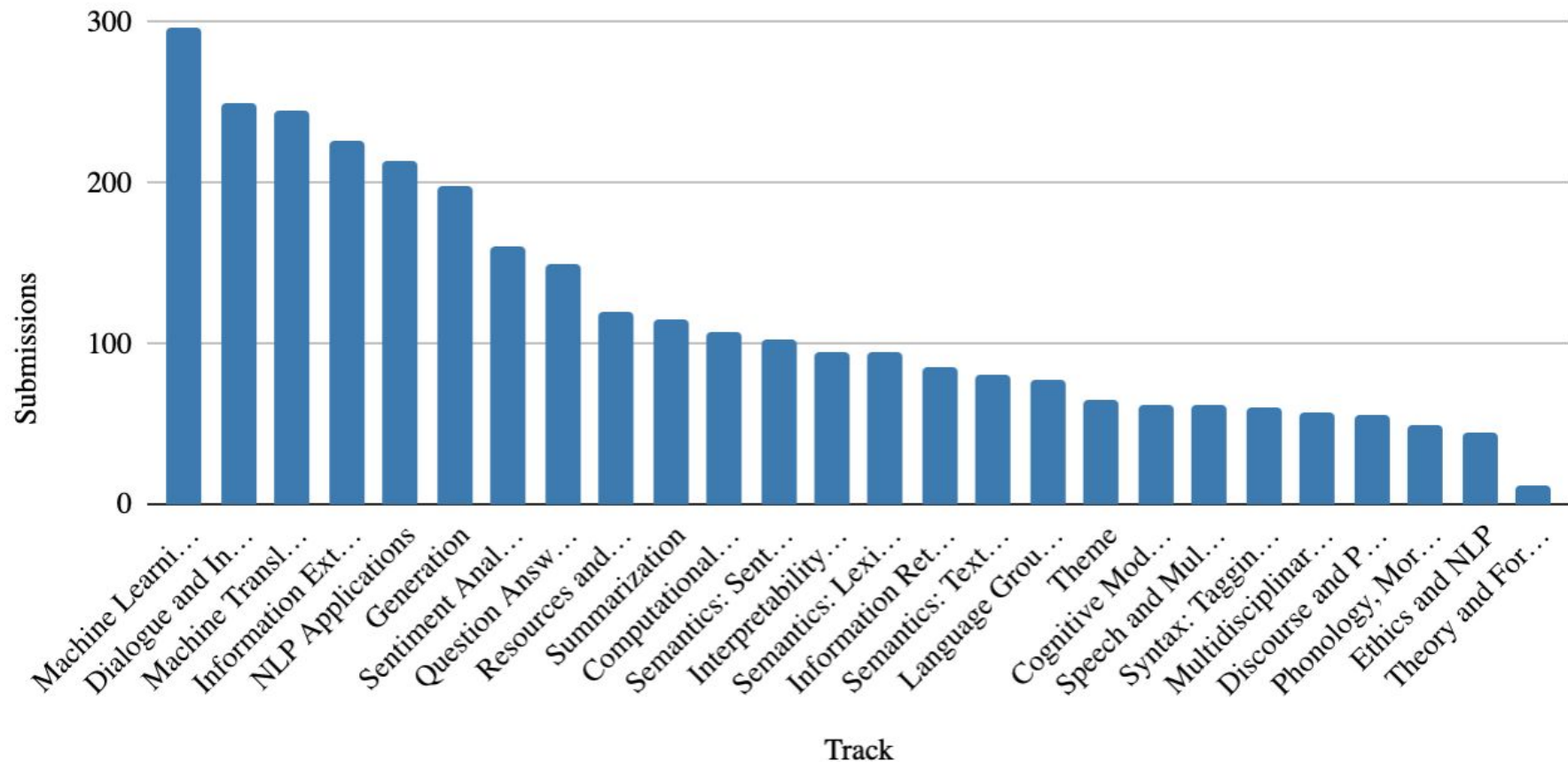


# The 58th Annual Meeting of the Association for Computational Linguistics



Design by Jingya Chen

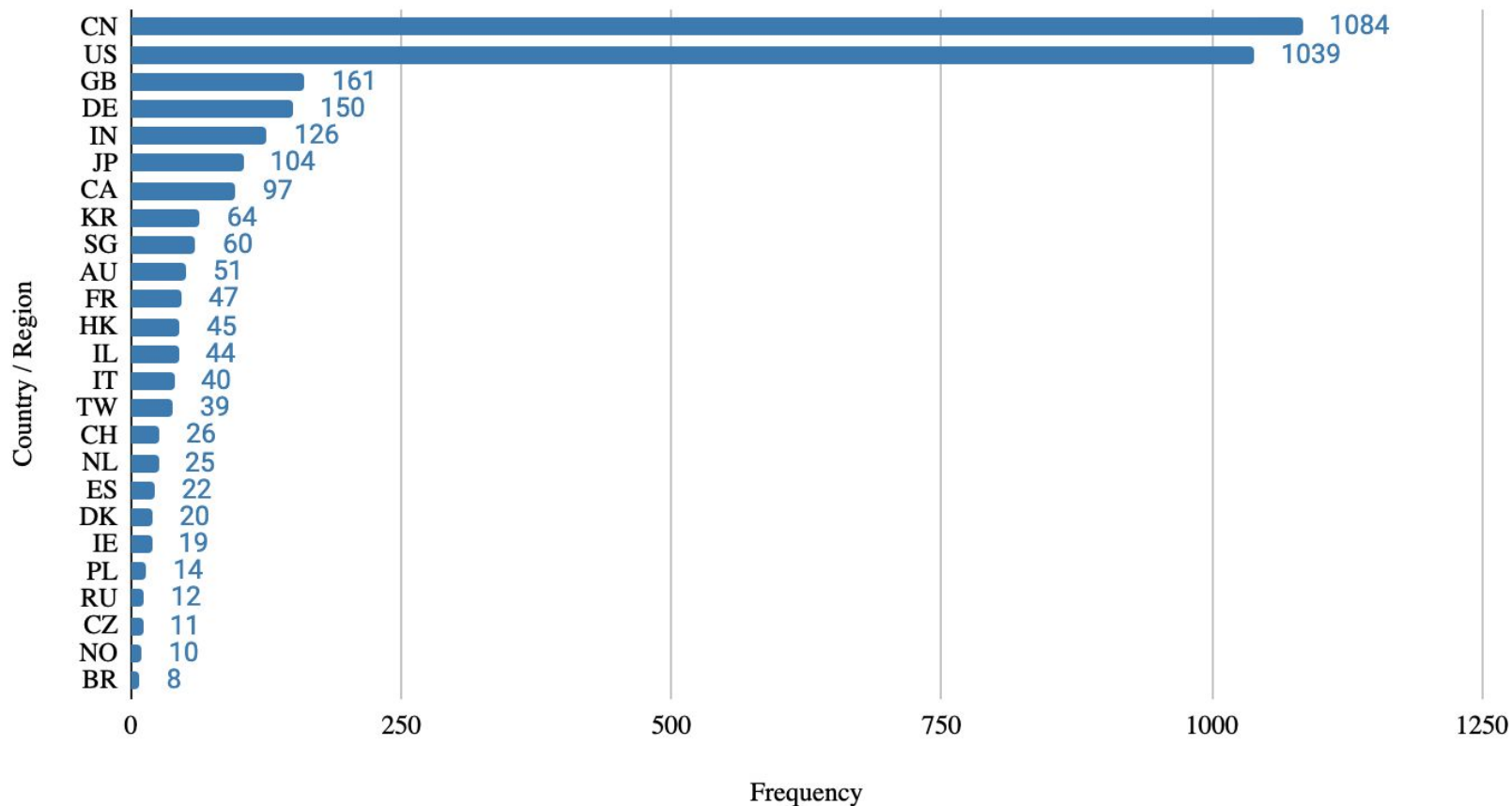
# Number of Submissions per Track



Trends of ACL:

[https://public.flourish.studio/visualisation/  
2431551/](https://public.flourish.studio/visualisation/2431551/)

## Number of Submissions per Country/Region (Contact Author)



# Less “I fine-tuned BERT on task X and it improved the performance on benchmark Y” papers

Этапы исследований в NLP:

1. Создание новой модели/архитектуры;
2. **Публикация результатов улучшения этой модели или применения к новым задачам;**
3. **Публикация статей, показывающие слабые стороны этой модели;**
4. Публикация нового датасета

# Shifting away from huge labeled datasets

За последние 2 года произошёл сдвиг: предобучаем модели self-supervised способом, а затем дообучаем их на небольших датасетах, созданных под конкретную задачу.

На ACL-2020 многие доклады были посвящены обучению моделей с меньшим supervision.

# 1. Data Augmentation

[Fabbri et al.](#) предложили подход для автоматической генерации троек (контекст, вопрос, ответ) для обучения QA модели.

[Jacob Andreas](#) предложил заменять редкие фразы более частыми, которые встречаются в похожих контекстах, чтобы улучшить генерализацию нейронных сетей.



## 2. Meta learning

[Yu et al.](#) используют meta learning для переноса знаний для задачи обнаружения гиперонимии от высокоресурсных языков (high-resource) к малоресурсным (low-resource).

### 3. Active learning

[Li et al.](#) разработали фреймворк для разметки данных для задачи разрешения кореференции, который выбирает наиболее значимые примеры для разметки с помощью active learning.

# Language models is not all you need — retrieval is back

Известно, что знания, закодированные в языковых моделях, неполные и неточные.

В статьях от [Kassner and Schütze](#) и [Allyson Ettinger](#) было показано, что языковые модели невосприимчивы к отрицаниям и легко путают похожие, но неправильные ответы.

Решения:

# 1. Retrieval

REALM: Retrieval-Augmented  
Language Model Pre-Training from  
Google

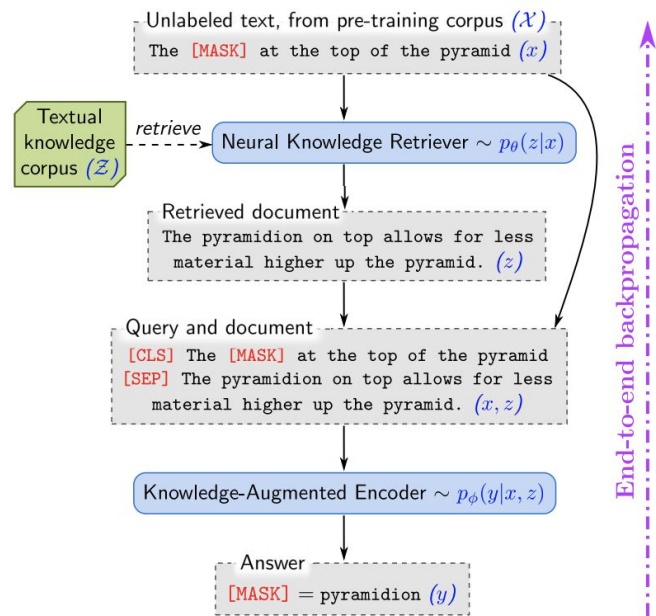


Figure 1. REALM augments language model pre-training with a **neural knowledge retriever** that retrieves knowledge from a **textual knowledge corpus**,  $\mathcal{Z}$  (e.g., all of Wikipedia). Signal from the language modeling objective backpropagates all the way through the retriever, which must consider millions of documents in  $\mathcal{Z}$ —a significant computational challenge that we address.

## 2. Using external KBs

[Guan et al.](#) обогатили GPT-2 знаниями из баз знаний.

[Wu et al.](#) использовали базы знаний для генерации диалога.

### 3. Enhancing LMs with new abilities

[Zhou et al.](#) обучили языковую модель накапливать знания о времени (например, частота и длительность событий), используя извлечение информации.

[Geva and Gupta](#) наделили BERT числовыми способностями, дообучая его на числовых и текстовых данных, которые требуют рассуждения над числами.

# Explainable NLP

[Kumar and Talukdar](#) предсказывают объяснение для каждого лэйбла.

[Hase and Bansal](#) разрабатывают методы оценки объясняющих моделей (explainable models).

Что ещё?



# Training NLP models with reinforcement learning

- Article summarization
- Question answering
- Dialogue generation
- Dialogue System
- Knowledge-based QA
- Machine Translation
- Text generation

# Text to Image

Generative Adversarial Text to Image Synthesis: <https://arxiv.org/abs/1605.05396>

this small bird has a pink breast and crown, and black primaries and secondaries.



this magnificent fellow is almost all black with a red crest, and white cheek patch.



the flower has petals that are bright pinkish purple with white stigma



this white and yellow flower have thin white petals and a round yellow stamen



*Figure 1.* Examples of generated images from text descriptions. Left: captions are from zero-shot (held out) categories, unseen text. Right: captions are from the training set.

Text descriptions  
(content)

Images  
(style)



The bird has a **yellow breast** with **grey** features and a small beak.

This is a large **white** bird with **black wings** and a **red head**.

A small bird with a **black head and wings** and features grey wings.

This bird has a **white breast**, brown and white coloring on its head and wings, and a thin pointy beak.

A small bird with **white base** and **black stripes** throughout its belly, head, and feathers.

A small sized bird that has a cream belly and a short pointed bill.

This bird is **completely red**.

This bird is **completely white**.

This is a **yellow** bird. The wings are **bright blue**.



Figure 6. Transferring style from the top row (real) images to the content from the query text, with  $G$  acting as a deterministic decoder. The bottom three rows are captions made up by us.

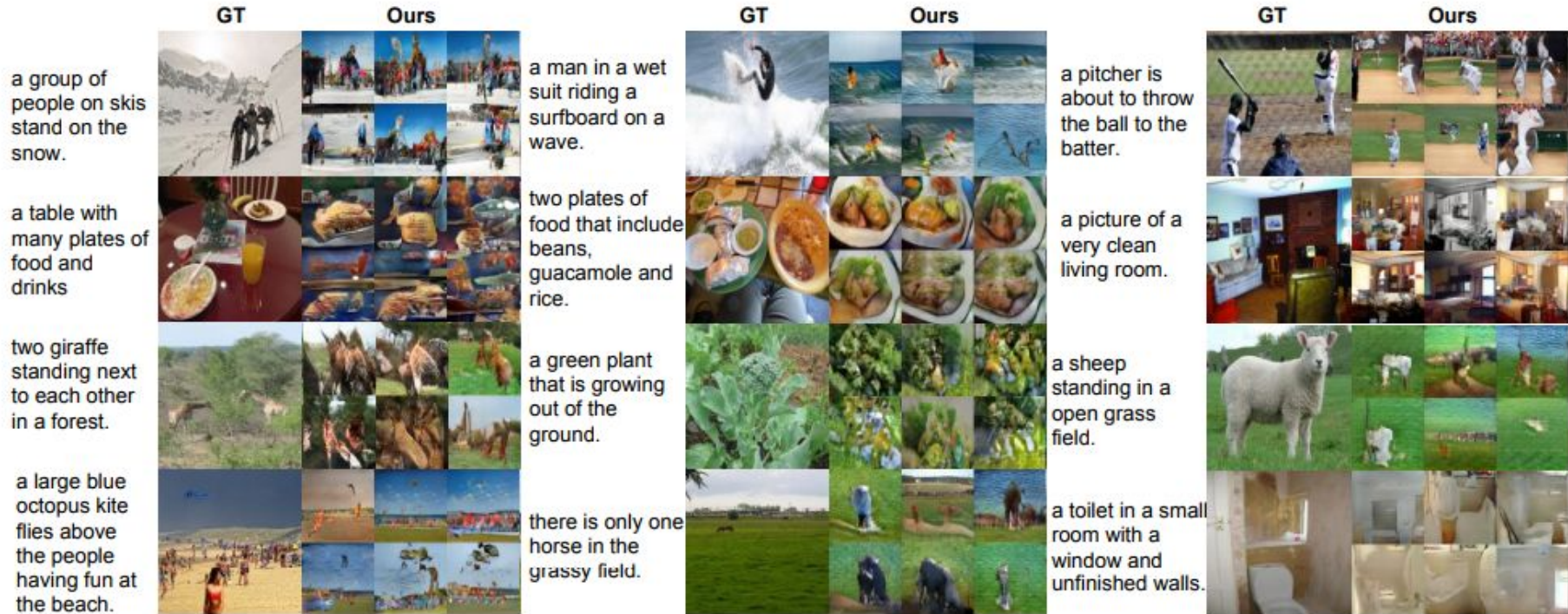


Figure 7. Generating images of general concepts using our GAN-CLS on the MS-COCO validation set. Unlike the case of CUB and Oxford-102, the network must (try to) handle multiple objects and diverse backgrounds.



# Visual Question Answering

<http://www.visualqa.org/>

Visual7W: Grounded Question Answering in Images:

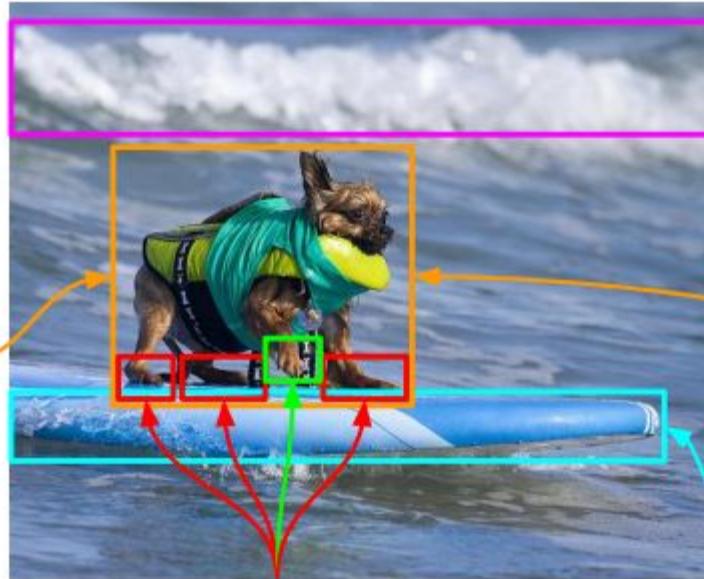
<https://arxiv.org/abs/1511.03416>

**Where does this scene take place?**

- A) In the sea. ✓
- B) In the desert.
- C) In the forest.
- D) On a lawn.

**What is the dog doing?**

- A) Surfing. ✓
- B) Sleeping.
- C) Running.
- D) Eating.



**Why is there foam?**

- A) Because of a wave. ✓
- B) Because of a boat.
- C) Because of a fire.
- D) Because of a leak.

**What is the dog standing on?**

- A) On a surfboard. ✓
- B) On a table.
- C) On a garage.
- D) On a ball.

**Which paw is lifted?**

# Adversarial Examples



adversarial  
perturbation



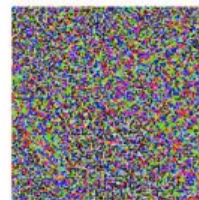
88% **tabby cat**

99% **guacamole**



'Duck'

+



$\times 0.07$

=



'Horse'



'How are you?'

+

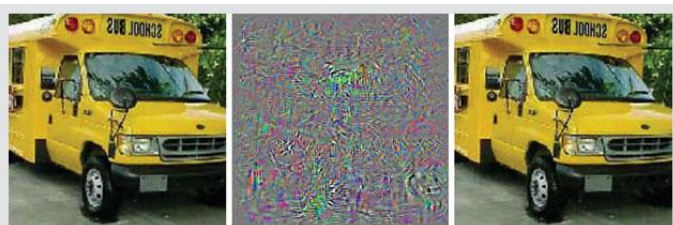


$\times 0.01$

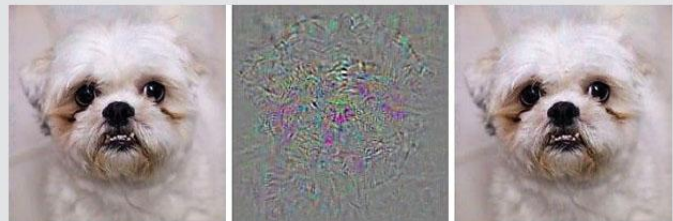
=



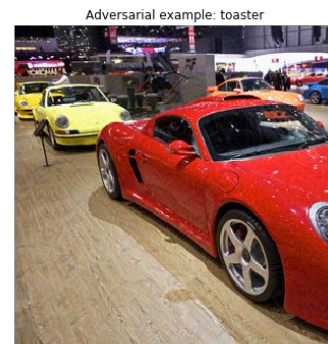
'Open the door'



School bus + tiny adversarial perturbation = "ostrich"



Dog + tiny adversarial perturbation = "ostrich"



# Adversarial Examples in NLP

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South Africa's historic Soweto township marks its 100th birthday on Tuesday in a mood of optimism.

57% **World**

South Africa's historic Soweto township marks its 100th birthday on Tuesday in a mood of optimism.

95% **Sci/Tech**

---

it's frustrating to see these guys who are obviously pretty clever waste their talent on parodies of things they probably thought were funniest when they were high. 83% **Negative Sentiment**

it's frustrating to see these guys who are obviously pretty **deft** waste their talent on parodies of things they probably thought were funniest when they were high.

65% **Positive Sentiment**

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[HotFlip: White-Box Adversarial](#)  
[Examples for Text](#)  
[Classification](#)





**СПАСИБО ЗА  
ВНИМАНИЕ!**

**НАДЕЮСЬ, ВАМ ВСЕ  
БЫЛО ПОНЯТНО!**