ClipCap: CLIP Prefix for Image Captioning

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Анализ данных

flickr30k_images (31.8k files)

About this directory

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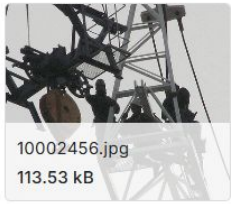
Image directory


1000092795.jpg
218.14 kB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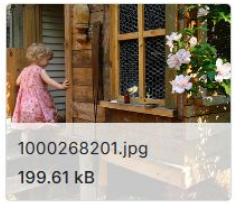
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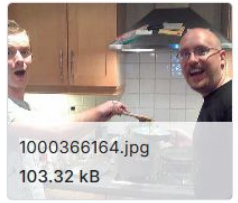
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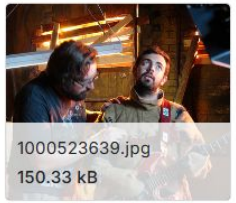
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1000919630.jpg
117.18 kB


10010052.jpg
44.51 kB


1001465944.jpg
141.08 kB

captions.txt (13.16 MB)

About this file

Add Suggestion

5 captions provided by human annotators for each image

This preview is truncated due to the large file size. Create a Notebook or download this file to see the full content.

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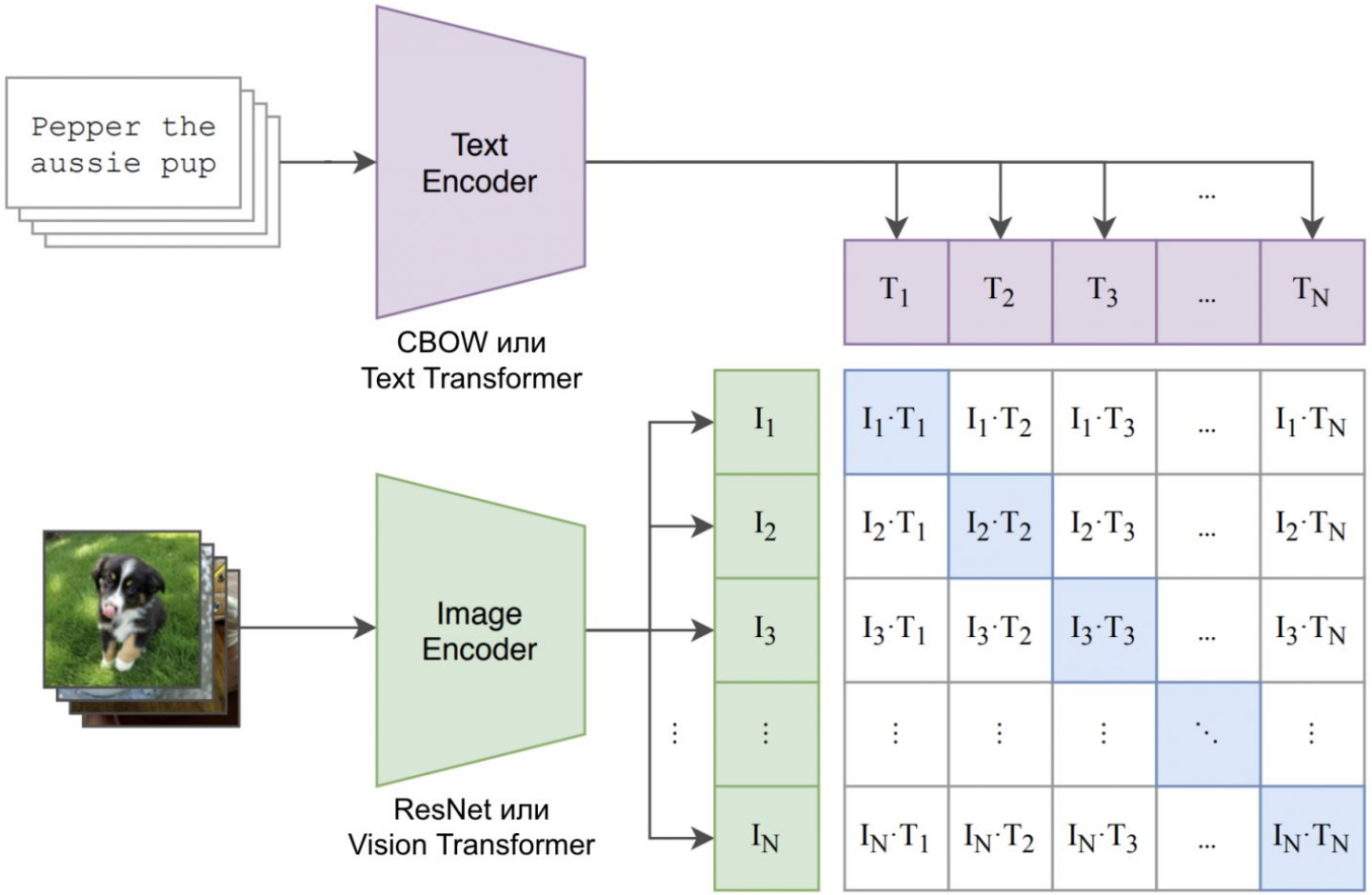
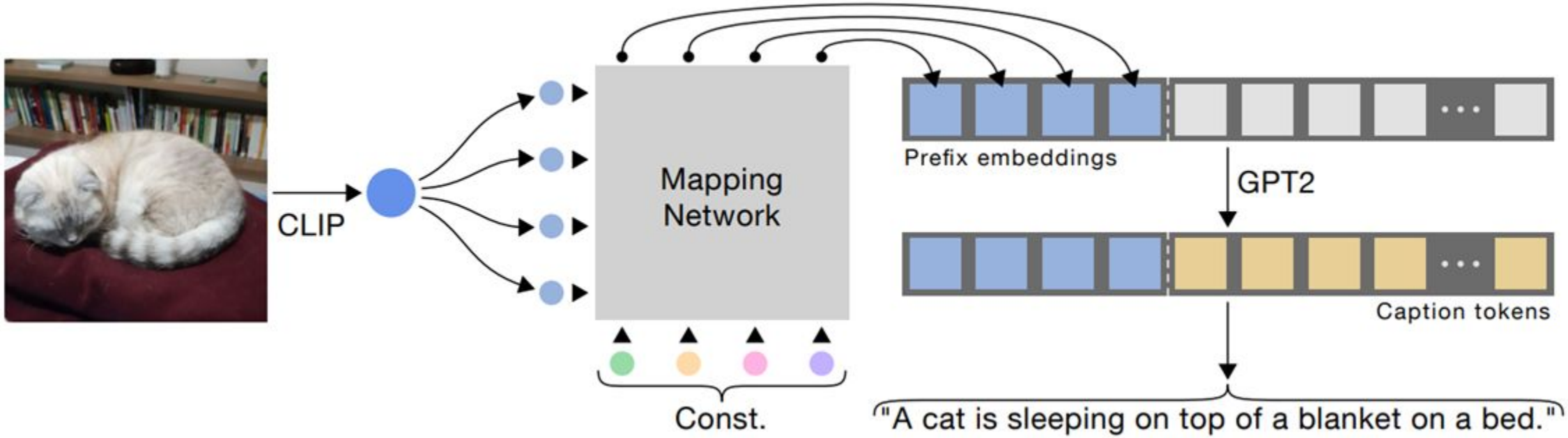
Create Notebook

```
image_name,comment_number,comment
1000092795.jpg,0,Two young guys with shaggy hair look at their hands while hanging out in the yard .
1000092795.jpg,1,Two young  White males are outside near many bushes .
1000092795.jpg,2,Two men in green shirts are standing in a yard .
1000092795.jpg,3,A man in a blue shirt standing in a garden .
1000092795.jpg,4,Two friends enjoy time spent together .
```

Принцип работы CLIP

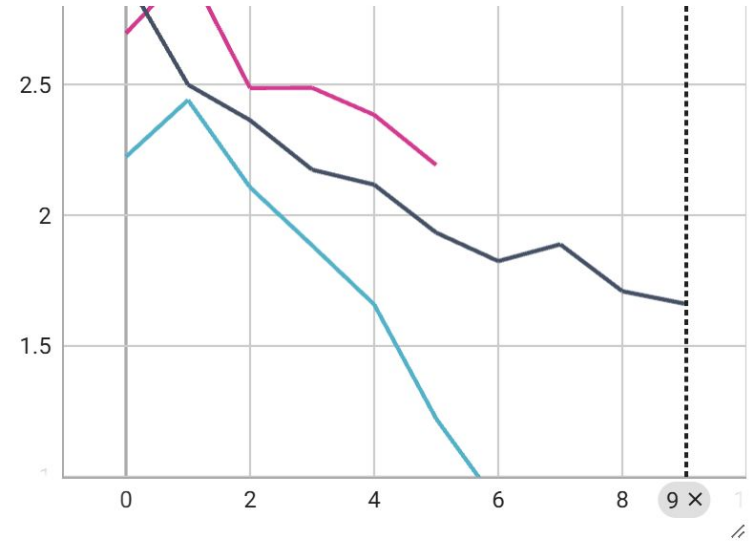


Архитектура ClipCap



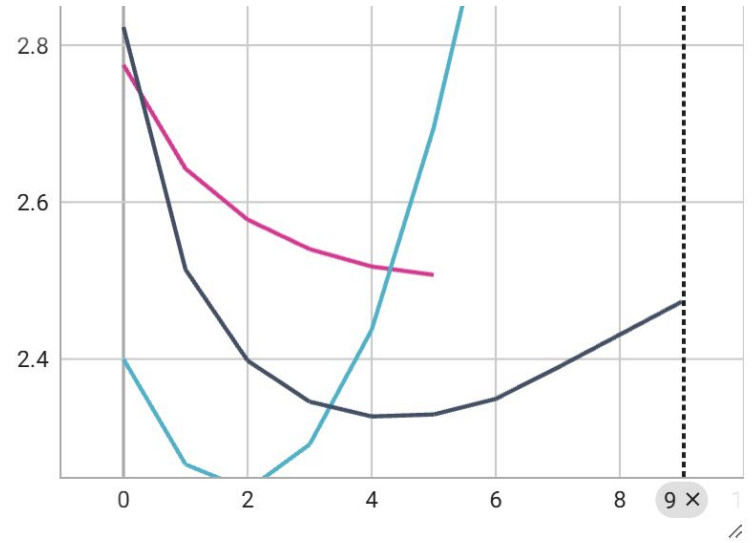
Логирование. Tensorboard

Loss/train



Run ↑	Value	Step	Relative
mapper-only	2,1921	5	3.31 hr
pref40batch15	0,7033	7	6.049 hr
pref5batch60	1,6623	9	4.24 hr

Loss/val



Run ↑	Value	Step	Relative
mapper-only	2,5074	5	3.31 hr
pref40batch15	3,3436	7	6.049 hr
pref5batch60	2,4733	9	4.24 hr

В чем были сложности

- Высокие требования к объему видеопамяти
- Недостаточный объем памяти HDD на Kaggle
- Переобучение

Демонстрация

[9]:
```python
# Смотрим картинку
img_url = 'https://www.brunetterunning.com/wp/wp-content/uploads/2018/09/nnrunningclub1-300x200.jpg'
images = Image.open(requests.get(img_url, stream=True).raw).convert("RGB")
display(images)
```

+ Code + Markdown

[10]:
```python
image = preprocess(images).unsqueeze(0).to(device)

with torch.no_grad():
    prefix = clip_model.encode_image(image).to(device, dtype=torch.float32)
    # prefix = prefix / prefix.norm(2, -1).item()
    prefix_embed = model.clip_project(prefix).reshape(1, prefix_length, -1)

generated_text_prefix = generate_beam(model, tokenizer, beam_size=7,embed=prefix_embed,stop_token='<|endoftext|>',entry_length=30)[0]

print(generated_text_prefix)
```

```
A group of people are jogging on a grassy area with trees in the background. A man in a black shirt is jogging with a woman
```

Результаты

	CIDEr	SPICE
ClipCap gpt2 + MLP batch 60 prefix 5	1.2224	0.2796
ClipCap gpt2 + MLP batch 10 prefix 40	**1.3029**	**0.3134**

Заключение

Идеи для улучшения:

- Увеличение объема входных данных и вычислительных мощностей.
- Использование более сложных моделей для предобработки визуальных данных.
- Использование LLM большего размера.

Вопросы