Адрес проекта на гугл-диске: <https://drive.google.com/drive/folders/1QsTeeWrYbGPP5pWZ2Xlddcpc65FM5GVz?usp=sharing>

Адрес исходников телеграм-бота на гитхабе: <https://github.com/yukonta/EasyCaption>

Каталог на гугл-диске: **YukontaImgCaptioning, в нем содержатся файлы:**

TableResults.docx – этот файл с описанием экспериментов;

yukonta\_image\_captionong.ipynb – ноутбук;

checkpoint.pt – файл с весами модели;

GoogleNews-vectors-negative300.bin – содержит предобученные эмбединги Word2Vec;

подпапка DATAannotations – с файлами, содержащими сaptions и пропущенные через энкодеры картинки для разных датасетов – см. ниже.

Для работы надо в ноутбуке yukonta\_image\_captionong.ipynb изменить корневой каталог PROJECT\_PATH на актуальный.

В каталог PROJECT\_PATH скопировать каталог YukontaImgCaptioning, который лежит на гугл-диске по адресу <https://drive.google.com/drive/folders/1QsTeeWrYbGPP5pWZ2Xlddcpc65FM5GVz?usp=sharing>

Ноутбук опционально предусматривает генерацию энкодерами (InceptionV3, Resnet50) из исходных наборов MSCOCO2017 и FLICKR30k -

файлов, содержащих преобразованные картинки форматов 2048 (вектор длины 2048) и 2048x8x8. Для генерации надо внутрь каталога PROJECT\_PATH поместить каталоги MSCOCO2017 (с подкаталогами data\_train2017,data\_val2017) и FLICKR30k с картинками из соответствующих датасетов

(датасеты MSCOCO2017 и FLICKR30k на моем гугл-диске не лежат (очень большие), их надо скачать с сайтов разработчиков этих датасетов).

Все остальное необходимое для экспериментов лежит на гугл-диске в каталоге YukontaImgCaptioning.

Проводились эксперименты как в соответствии с базовой частью задания, так и с **вариативной**.

Результаты наиболее показательных экспериментов приведены в таблице 1 ниже. Для сравнения сгенерированных текстов по смыслу были взяты подписи к картинкам из бейзлайна (Скейтбордист и Кошка с собакой). Результаты для других картинок – в таблице 2.

В вариативной части проводились эксперименты со следующими дополнениями к бейзлайну:

**1)** Сделан **телеграм-бот EasyCaption** – см. исходники на гитхабе : <https://github.com/yukonta/EasyCaption>

(Запускаю на компьютере в GooglCloud)

**2)** Использовались предобученные эмбеддинги - из Word2Vec.

**3)** Эксперименты с двумя вариантами энкодера – **InceptionV3** и **Resnet50 (качество предсказания похоже для InceptionV3 и Resnet50).**

**4)** Эксперименты с тремя вариантами датасета: **MSCOCO2014, MSCOCO2017, Flickr30k**.

Для перечисленных датасетов файлы с «Captions» и с пропущенными через сети InceptionV3 и Resnet50 картинками находятся в подкаталоге:

**YukontaImgCaptioning\DATAannotations**

**Заметила, что в результате обучения на датасете Flickr30k - больше акцент на цвета персонажей (чем при обучении на MSCOCO).**

Для датасета **MSCOCO2017** заголовки«сaptions» выделены из датасета и сохранены в файл captions\_tokenized\_MSCOCO2017.json.   
С **flickr30k** проще – там «сaptions» содержатся в позиции «comment» в файле Flickr30k\_results.csv, поэтому отдельный файл для «сaptions» для Flickr30k я не создавала.

Исходные картинки из MSCOCO2017 (и подмножеств MSCOCO2017), Flickr30k были «пропущены» через сети InceptionV3 и Resnet50 и результаты сохранены в файлы:

image\_codes\_MSCOCO2017\_incept3.npy, image\_codes\_flickr30k\_incept3.npy,

image\_codes\_MSCOCO2017\_resnet50.npy, image\_codes\_flickr30k\_resnet50.npy.

Для подмножеств MSCOCO2017 аналогично созданы файлы с преобразованными картинками – перечень см. ниже.

**На гугл-диске в каталоге YukontaImgCaptioning\DATAannotations находятся файлы:**

**для набора MSCOCO2014:**

папка MSCOCO2014 со структурой внутренних каталогов как в бейзлайне (в \MSCOCO2014\handout\data содержится файл captions\_tokenized.json с заголовками и файл image\_codes.npy с закодировнными картинками в формате векторов длиной 2048)

**для набора MSCOCO2017:**

captions\_tokenized\_MSCOCO2017.json – файл, содержащий captions для MSCOCO2017 (собранный вместе из частей train и val исходного датасета, потому что я потом сама делю полную выборку на наборы для тренировки и валидации);

image\_codes\_MSCOCO2017\_incept3.npy – файл с картинками из MSCOCO2017, пропущенными через **InceptionV3**;

image\_codes\_MSCOCO2017\_resnet50.npy – файл с картинками из MSCOCO2017, пропущенными через **Resnet50**;

**для набора flickr30k:**

image\_codes\_flickr30k\_insept3.npy – файл с картинками из **flickr30k**, пропущенными через InceptionV3;

image\_codes\_flickr30k\_resnet50.npy – файл с картинками из **flickr30k**, пропущенными через Resnet50;

(captions выделяются непосредственно в программе из файла Flickr30k\_results.csv)

**для набора MSCOCO2017\_20000 (подмножество MSCOCO2017):**

captions\_tokenized\_MSCOCO2017\_20000.json - файл, содержащий captions для выборки 20000 картинок из MSCOCO2017;

image\_codes\_MSCOCO2017\_20000\_incept3.npy – файл с картинками, пропущенными через InceptionV3 (выборка 20000 картинок из MSCOCO2017);

**для набора MSCOCO2017\_VAL (из оригинального набора MSCOCO2017/ data\_val2017, содержащего 5000 картинок):**

captions\_tokenized\_MSCOCO2017\_val.json - файл, содержащий captions для 5000 картинок из MSCOCO2017/ data\_val2017;

image\_codes\_MSCOCO2017\_val\_incept3.npy – файл с картинками, пропущенными через InceptionV3 (выборка 5000 картинок из MSCOCO2017/ data\_val2017);

а также исходные файлы, использованные для построения датасетов:

Flickr30k\_results.csv – файл с аннотациями датасета Flickr30k;

captions\_train2017.json – файл, содержащий captions для MSCOCO2017/data\_train2017;

captions\_val2017.json – файл, содержащий captions для MSCOCO2017/data\_val2017;

**5) Attention** – эксперименты с двумя типами тензора картинок:

а) 1х2048 (как в бейзлайне)

б) 2048х8х8 – выходной параметр x\_for\_attn в BeheadedInception3.forward.

В варианте (а) с Attention - ['cat', 'one-layer-net', 'dot', 'bahdanau'] на наборе данных MSCOCO2017 результат лучше не стал по сравнению с вариантами без Аттеншена ('bahdanau' из всех перечисленных методов дал лучший результат). Attention-ом лучше «смотреть» на последовательность (тензор 2048х8х8 представляет собой последовательность разных элементов картинки) , а в варианте (а) одна картинка в виде вектора (не последовательность), поэтому не хватает информации.

В варианте (б) проблема в том, что преобразованные картинки занимают много памяти. Поэтому для большого датасета MSCOCO2017 я каждую преобразованную картинку сохраняла в отдельный файл. А для меньших датасетов MSCOCO2017\_20000, MSCOCO2017\_val массив с преобразованными картинками поместился в память. В ноутбуке запрограммированы все эти варианты – есть код, чтобы сделать отдельные файлы (на диске) преобразованных картинок и чтобы сделать массивы в памяти с преобразованными картинками.

Однако с полным датасетом MSCOCO2017 (когда преобразованные картинки в отдельных файлах) процесс тренировки сети продолжался так долго, что я не дождалась результатов. А на маленьких датасетах результаты с Аттеншеном не лучше, чем без него (см. таблицу 1). Разные **teacher\_forcing\_ratio** пробовала.

**6)** Различные **гиперпараметры (batch\_size, lr, emb\_size)**, разное количество слоев LSTM (1, 2), разное количество конкатенированных LSTM (от 1 до 3), размер hidden и cell –векторов, lstm\_dropout. Пробовала различные значения clip для для torch.nn.utils.clip\_grad\_norm\_, разные adam\_weight\_decay

Динамически меняющийся lr (в зависимости от динамики val\_loss – lr\_scheduler.ReduceLROnPlateau(optimizer, factor=lr\_scheduler\_factor, patience=2, verbose=True)). Пробовала различные ограничения на включение слов в словарь (встречающиеся не меньше 2, 3, 4, 5 раз в датасете).

**7) EarlyStopping**, параметры модели с лучшей перплексией (при валидации) сохраняются в файл. Предусмотрена загрузка из файла параметров модели перед предсказанием.

**8)** Построены **графики** train и val лоссов и Perplexity

По качеству (наиболее осмысленные) мне понравились подписи в [варианте 302](#Вариант302) (это гиперссылка – можно нажать и перейти к варианту 302).

Таблица 1 – результаты экспериментов

**Первая цифра номера варианта означает тип эксперимента.**

**1 – Эксперименты на датасете MSCOCO2014 с картинками из бейзлайна (пропущенными через InceptionV3)**

**2 - Эксперименты на датасете Flickr30k, картинки пропущены через InceptionV3 и Resnet50.**

**3 - Эксперименты на датасете MSCOCO2017 (полном), картинки пропущены через InceptionV3**

**4. Эксперименты на датасете MSCOCO2017 с картинками, пропущенными через Resnet50**

**5. Эксперименты с Attention bahdanau, преобразованная картинка 1х2048, датасет MSCOCO2017, картинки пропущены через InceptionV3**

**6. Эксперименты с Attention bahdanau, преобразованная картинка 1х2048, датасет MSCOCO2017, картинки пропущены через Resnet50**

**7. Эксперименты с Attention bahdanau, преобразованная картинка 2048x8x8, выборки разного размера из MSCOCO2017,   
картинки пропущены через InceptionV3**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Гиперпараметры и особенности** | **Val Perplexity** | **Текст для скейтбордиста** | **Текст для кошки с собакой** | **Комментарий** |
| **1. Эксперименты на датасете MSCOCO2014 с картинками из бейзлайна (пропущенными через InceptionV3)** | | | | |
| **Вариант 101**  num\_epochs = 10  batch\_size = 64  max\_caption\_len = 100  lr = 0.001  emb\_size= 300  embed\_usepretrained = False  *(предтренированные эмбеддинги от Word2Vec)*  lstm\_units = 256  lstm\_num\_layers = 1  lstm\_num = 1  *#кол. конкатенированных LSTM*  *на вход первой подается embedding, выход из первой подается на вход второй LSTM*  lstm\_dropout = 0.3  lattn\_model = None  clip = 1  adam\_weight\_decay = 0 teacher\_forcing\_ratio = 0  Вставляем в словарь **все** слова из датасета | 18.41  15.16  13.71  13.13  12.74  12.52  12.28  12.20  12.19  **12.00** | a man riding a skateboard down a ramp .  a man riding a skateboard down a ramp .  a man riding a skateboard down a ramp .  a man doing a trick on a skateboard .  a man riding a skateboard down a ramp .  a man riding a skateboard down a ramp .  a man riding a skateboard down the side of a ramp .  a man riding a skateboard down a ramp .  a man riding a skateboard down the side of a ramp .  a man riding a skateboard down a ramp . | a cat is sitting on a chair in a room .  a cat is sitting on a chair in a room .  a cat is sitting on a chair with a stuffed animal .  a cat is sitting on a chair in a room .  a cat is sitting on a chair in a room .  a cat is sitting on a chair in a room .  a cat is sitting on a chair in a room .  a cat is sitting on a chair in a room .  a cat is sitting in a chair with a stuffed animal .  a cat is sitting on a chair with a remote . |  |
| **Вариант 102**  как в варианте 101, кроме:  **embed\_usepretrained = Tru**e | 17.00  13.93  12.93  12.39  12.04  11.79  11.75  11.31  11.37  **11.16** | a man doing a trick on a skateboard on a ramp .  a man doing a trick on a skateboard .  a man is doing a trick on a skateboard .  a man doing a trick on a skateboard .  a man riding a skateboard down a street .  a man riding a skateboard down a ramp .  a man riding a skateboard down a ramp .  a man on a skateboard doing a trick on a ramp .  a skateboarder is doing a trick on a ramp .  a man riding a skateboard on top of a cement block . | a cat is standing in a room with a remote control .  a cat is sitting on a chair with a remote control .  a cat is sitting on a blue chair .  a cat is sitting on a chair with a remote control .  a cat is sitting in a chair with a remote .  a cat is sitting on a chair with a remote control .  a cat is sitting in a chair with a remote control .  a cat is sitting on a chair with a remote control .  a cat is sitting on a couch with a remote control .  a cat is sitting in a chair with a remote control . | Лучше, чем в1 |
| **Вариант 103**  как в варианте 102, кроме:  **stm\_num\_layers = 2** | 18.34  14.66  13.57  12.70  12.16  11.87  11.78  11.58  11.44  **11.22** | a man riding a skateboard down a rail on a ramp .  a man riding a skateboard on a rail .  a man riding a skateboard on a rail .  a man riding a skateboard down a rail on a ramp .  a man riding a skateboard down a rail on a ramp .  a man riding a skateboard down a rail on a ramp .  a man riding a skateboard down a rail on a ramp .  a man riding a skateboard down a cement block .  a man riding a skateboard down a cement block .  a skateboarder is jumping over a rail in a skate park . | a black and white cat laying on top of a bed .  a brown and white cat laying on a bed .  a brown and white cat laying on a bed  a cat that is laying down on a couch .  a cat is sitting on a bed with a blanket .  a cat is sitting on a bed with a cat .  a cat is sitting on a blanket on a couch .  a black and white cat laying on top of a bed .  a cat is sitting on a bed with a stuffed animal .  a black and white cat laying on a couch | текст-лучше,  можно было учить дальше |
| **Вариант 104**  как в варианте 103, кроме:  **lstm\_num = 2** #количество конкатенированных LSTM,  20 эпох | 17.67  14.37  12.93  12.28  11.89  11.63  11.32  11.27  11.07  11.01  10.97  10.85  10.72  10.65  10.61  10.82  10.58  **10.57**  10.61  10.72 | a man is riding a skateboard up the side of a ramp .  a man riding a skateboard up a ramp .  a man riding a skateboard up into the air .  a man riding a skateboard up a ramp .  a man riding a skateboard up a ramp .  a man riding a skateboard up the side of a ramp .  a man riding a skateboard up the side of a ramp .  a man riding a skateboard up a ramp .  a man riding a skateboard up into the air .  a man riding a skateboard up a ramp . | a cat is sitting on a chair with a hat .  a cat is sitting on a chair with a stuffed animal .  a cat is sitting on a chair with its eyes closed .  a black and white cat laying on top of a bed .  a cat with a red collar sitting on a chair .  a black and white cat is laying on a bed  a cat is sitting on a chair with a stuffed animal .  a cat with a red collar on sitting on a chair .  a black and white cat laying on top of a bed .  a cat that is laying down on a rug . | нет про собаку… |
| **Вариант 105**  как в варианте 104, lstm\_dropout = 0.1 | 16.18  13.54  12.39  12.00  11.43  11.43  11.17  10.97  10.83  10.73  10.69  10.83  10.67  10.70  10.67  10.60  **10.55**  10.62  10.66  10.64 | a skateboarder is in mid air performing a trick .  a man riding a skateboard down a ramp .  a man in a blue shirt and jeans is doing a trick on a skateboard .  a man on a skateboard doing a trick .  a man riding a skateboard up the side of a ramp .  a man riding a skateboard on top of a ramp .  a man riding a skateboard up the side of a ramp .  a man on a skateboard performing a trick .  a skateboarder is in mid air on a ramp .  a man riding a skateboard up the side of a ramp . | a cat is wearing a hat and a tie .  a cat is sitting on a couch with a remote control .  a cat is wearing a knitted hat and fur .  a cat is wearing a knitted hat on a couch .  a cat that is wearing a sweater and a hat .  a cat is sitting on a couch with a blanket .  a cat that is sitting on a couch .  a cat is standing on a couch with a remote control .  a cat is sitting on a couch with a remote control .  a cat is wearing a hat and a hat . | с кошками совсем непонятно… |
| **Вариант 106**  как в варианте 105, lstm\_dropout = 0.3  но для **lstm\_num = 2** # в каждую из двух LSTM на вход подаются embedding и потом выходы двух LSTM конкатенируются | 16.05  13.44  12.20  11.66  11.47  11.18  10.97  10.81  10.98  10.84  10.89  10.75  10.62  10.56  10.58  10.56  10.64  10.63  10.56  **10.48** | a skateboarder doing a trick on a half pipe .  a man doing a trick on a skateboard on a ramp .  a skateboarder doing a trick on a ramp .  a skateboarder is doing a trick on a ramp .  a skateboarder performing a trick on a half pipe .  a skateboarder doing a trick in the air .  a skateboarder doing a trick on a ramp .  a skateboarder doing a trick on a ramp .  a man doing a trick on a skateboard on a ramp .  a skateboarder doing a trick on a half pipe . | a cat sitting on a couch with a remote control .  a cat is sitting on a bed with a blue blanket .  a cat is sitting on a couch with a remote control .  a small dog laying on a bed with a blanket .  a cat sitting on the ground next to a remote control .  a cat is sitting on a couch with a remote control .  a cat sitting on top of a couch .  a cat sitting on a bed with a blanket .  a cat sitting on a couch next to a remote control .  a small dog laying on the ground next to a remote control . | собака появилась!  Надо больше эпох запустить |
| **Вариант 107**  как в варианте 106, но  в конце два линейных слоя | 15.42  13.32  12.42  11.90  11.68  11.47  11.20  11.08 | a man jumping up in the air on a skateboard .  a man riding a skateboard up the side of a ramp .  a man doing a trick on a skateboard on a ramp .  a man is doing a trick on a skateboard .  a man riding a skateboard down a ramp .  a man jumping up in the air on a skateboard .  a man is doing a trick on a skateboard .  a man is doing a trick on a skateboard .  a man riding a skateboard on a ramp .  a man doing a trick on a skateboard . | a cat laying on a bed with a remote control .  a cat laying on top of a bed .  a cat is laying on a suitcase with a cat .  a cat is laying on a bed with a remote .  a cat laying on a bed with a stuffed animal .  a cat laying on top of a bed with a pillow .  a cat laying on top of a bed next to a remote control .  a cat is laying on a bed with a remote .  a cat laying on a bed with a remote .  a cat is sitting on a couch with a remote . | Лучше не стало |
| **Вариант 108**  как в варианте 106,  но пробуем динамический lr  **exp\_lr\_scheduler = lr\_scheduler.StepLR(optimizer, step\_size=7, gamma=0.1)** | 16.87  14.09  13.02  12.19  12.12  11.60  11.23  10.74  10.90  10.88  10.76  10.79  10.63  10.52  10.72  10.62  10.56  **10.54**  10.67  10.64 | a man riding a skateboard down a ramp .  a man riding a skateboard down a ramp .  a man riding a skateboard down a ramp .  a man riding a skateboard down a ramp .  a man riding a skateboard down a ramp .  a man riding a skateboard down a ramp .  a man riding a skateboard down a ramp .  a man riding a skateboard down the side of a ramp .  a man riding a skateboard down a ramp .  a man riding a skateboard down a ramp . | a cat that is sitting on a couch .  a black and white cat sitting on a couch .  a cat is sitting on a couch with a remote control in its mouth .  a cat is sitting on a couch with a remote .  a cat sitting on a couch with a remote control in its mouth .  a cat is sitting on a couch with a remote control .  a small dog wearing a black hat and a black hat  a cat is sitting on a couch with a stuffed animal .  a cat is sitting on a couch looking at the camera .  a black and white cat laying on a couch . | не очень… |
| **Вариант 109**  как в варианте 106,  **но lstm\_units = 512** | 14.40  12.50  11.38  11.26  10.97  10.69  10.71  10.57  10.59  10.44  10.46  **10.42**  10.49  10.46  10.60  10.58  10.65  10.71  10.65  10.70 | a skateboarder performing a trick on a half pipe .  a skateboarder doing a trick in the air .  a skateboarder performing a trick on a half pipe .  a skateboarder doing a trick on a half pipe .  a skateboarder is doing a trick on a half pipe .  a skateboarder is doing a trick on a half pipe .  a skateboarder performing a trick on a half pipe .  a skateboarder is doing a trick on a half pipe .  a person on a skateboard in the air .  a skateboarder is in mid air doing a trick . | a black and white cat laying on a bed .  a black and white cat laying on a couch .  a black and white cat laying on a couch .  a black and white cat laying on a couch .  a black and white cat laying on a bed .  a black and white cat laying on a bed .  a black and white cat laying on a couch .  a black and white cat laying on a couch .  a black and white cat laying on a bed .  a black and white cat laying on a couch . | Опять нет собаки… |
| **Вариант 110**  как в варианте 106,  lstm\_units = 256  # в каждую из **трех** LSTM на вход подаются embedding и потом выходы **трех** LSTM конкатенируются | 14.45  12.47  11.81  11.31  11.07  10.90  10.79  10.53  10.65  **10.45**  10.64  10.60  10.53  10.64 | a skateboarder is doing a trick on a ramp .  a man riding a skateboard on top of a cement wall .  a skateboarder is doing a trick on a ramp .  a skateboarder in a blue shirt doing a trick  a skateboarder is in mid air on a skateboard ramp .  a skateboarder in a blue shirt doing a trick  a skateboarder doing a trick in a skate park .  a skateboarder performs a trick on a ramp  a skateboarder is doing a trick on a ramp .  a man riding a skateboard on a ramp . | a black and white cat laying on a white chair .  a black and white cat wearing a tie .  a cat is standing on a chair with a remote .  a black and white cat wearing a tie .  a cat is sitting next to a pair of shoes .  a cat is sitting in a chair looking at the camera .  a cat sitting on top of a chair .  a cat is standing next to a brown teddy bear .  a cat is standing in front of a door .  a cat is sitting on a chair with a hat on . | текст интереснее, но собаки нет |
| **Вариант 111**  как в варианте 106,  # в каждую из **трех** LSTM на вход подаются embedding и потом выходы **трех** LSTM конкатенируются,  В словарь берем слова, которые не меньше 3 раз | 15.41  12.92  11.93  11.37  10.97  10.82  10.49  10.51  10.39  10.35  10.14  10.20  10.18  10.14  10.24  10.12  10.13  10.18  **10.03**  10.22 | a man on a skateboard doing a trick .  a man is doing a trick on a skateboard  a man on a skateboard performs a trick on a ramp .  a man on a skateboard doing a trick .  a man on a skateboard jumping off a ramp .  a man on a skateboard doing a trick .  a man on a skateboard doing a trick on a ramp .  a man is doing a trick on a skateboard  a man on a skateboard is performing a trick .  a man on a skateboard doing a trick . | a close up of a cat with a red tag on its head  a cat with a red collar and a brown hat .  a cat is sitting on a couch with a red hat .  a cat with a blue hat and a red hat .  a cat with a red collar is sitting on a couch .  a close up of a cat laying on a couch  a close up of a cat laying on a couch  a close up of a cat laying on a couch  a cat with a red collar is sitting on a couch .  a cat with a red collar and a red hat on . | Про кошек совсем чушь… |
| **Вариант 112**  как в варианте 106,  lstm\_num = 2 #количество конкатенированных LSTM, # в каждую из **двух** LSTM на вход подаются embedding и потом выходы **двух** LSTM «стакаются»,  lstm\_dropout = 0.4  В словарь берем слова, которые не меньше 5 раз | 16.54  13.44  12.54  11.77  11.44  11.00  10.89  10.85  10.67  10.60  10.33  10.35  10.37  10.25  10.19  10.18  10.14  10.12  **9.95**  9.99 | a man riding a skateboard down a street .  a man riding a skateboard down a street .  a man riding a skateboard down the side of a ramp .  a man riding a skateboard down a street .  a man riding a skateboard down the side of a ramp .  a man riding a skateboard down a street .  a man riding a skateboard down the side of a ramp .  a man riding a skateboard down the side of a ramp .  a man riding a skateboard down a ramp .  a man riding a skateboard down a sidewalk . | a close up of a cat with a tag on its head  a cat is sitting on a couch with a remote control .  a black and white cat is sitting on a couch  a cat is wearing a tie and a hat .  a small brown and white cat sitting on a red couch .  a close up of a cat wearing a tie  a cat is sitting on a couch with a toy .  a black and white cat laying on a couch .  a cat is wearing a red knitted hat .  a close up of a cat with a tag on its head | опять нет собак |
| **Вариант 113**  как в варианте 12,  но Lr=0.0001 |  | a man riding a skateboard on top of a wooden ramp .  a man doing a trick on a skateboard .  a man riding a skateboard on top of a ramp .  a man is doing a trick on a skateboard  a man riding a skateboard on top of a ramp .  a man doing a trick on a skateboard .  a man riding a skateboard on a ramp .  a man doing a trick on a skateboard on a ramp .  a man doing a trick on a skateboard .  a man riding a skateboard on top of a wooden rail . | a close up of a cat laying down on a couch  a small black and white dog laying on a blanket .  a black and white dog laying on a bed .  a black and white dog laying on a bed .  a black and white dog laying on a bed .  a cat laying on a blanket on a blanket .  a black and white cat is laying on a black and white blanket  a black and white cat laying on a bed .  a small black and white dog with a tie on .  a black and white cat laying on a bed . | Кошка и собака, но не вместе |
| **2. Эксперименты на датасете Flickr30k, картинки пропущены через InceptionV3 и Resnet50**  **В результате обучения на датасете Flickr30k - больше акцент на цвета персонажей (чем при обучении на MSCOCO)** | | | | |
| **Вариант 201**  **Набор Flickr30k**  **энкодер InceptionV3**  batch\_size = 64  lr = 0.0005  emb\_size= 300  embed\_usepretrained = True  lstm\_units = 256  lstm\_num\_layers = 2  lstm\_num = 2 #количество конкатенированных LSTM  lstm\_dropout = 0.3  adam\_weight\_decay = 0.000005  Словарь из слов >=5 раз | 1- 48.72  2- 33.70  3- 28.14  4- 26.04  5- 23.51  6- 22.23  7- 20.75  8- 20.16  9- 19.54  10- 19.16  11- 18.20  12- 18.36  13- 17.91  14- 17.42  15- 17.15  16- 17.33  17- 17.25  18- 17.15  19- 16.65  20- 16.63  21- 16.13  22- 16.49  23- 16.45  24- 16.75  25- 16.10  26- 16.56  27- 16.27  28- 16.33  **29- 15.95**  30- 16.19 | a man in a blue shirt is jumping over a hurdle .  a man in a blue shirt is jumping off a diving board .  a man in a blue shirt is doing a trick on a skateboard .  a man in a green shirt and blue shorts is jumping over a hurdle .  a man in a blue shirt and blue shorts is jumping in the air .  a man in a blue shirt is jumping into a pool .  a man in a blue shirt is doing a skateboard trick .  a man in a blue shirt is jumping off a diving board .  a man in a blue shirt is doing a skateboard trick on a skateboard .  a man in a blue shirt is jumping off a diving board . | a brown dog is standing in front of a red and white wall .  a black and white dog is looking at a white object .  a black and white dog is looking at a red object .  a small dog is looking at a large white object .  a black and white dog is standing in front of a red wall .  a black and white dog is standing in front of a red wall .  a brown dog is standing in front of a large white wall .  a brown dog is looking at a white object .  a black and white dog is running on the grass .  a black and white dog is standing in front of a red wall . | кошки нет  Акценты на цвет персонажей |
| **Вариант 202**  **как 201,**  **но**  **lstm\_num\_layers = 1**  **lstm\_dropout = 0.2**  Словарь из слов >=2 раз | 1- 46.23  2- 33.88  3- 27.85  4- 25.13  5- 22.83  6- 21.68  7- 21.51  8- 20.09  9- 19.44  10- 18.89  11- 18.48  12- 18.24  13- 17.91  14- 17.27  15- 17.44  16- 17.35  17- 17.52  18- 17.10  19- 17.45  20- 17.19  21- 17.09  22- 16.85  23- 17.52  24- 16.89  25- 16.40  26- 16.57  27- 16.67  28- 16.70  29- 16.42  30- 16.61  31- 16.63  32- 16.62  33- 16.48  34- 16.58  35- 16.64  36- 16.79  37- 16.52  38- 16.95  39- 16.78  40- 17.02  41- 16.92  42- 16.76  43- 16.51  44- 16.85  45- 17.33  46- 16.50  47- 16.87  48- 16.87  49- 17.03  50- 16.87 | a man in a blue shirt is doing a trick on a skateboard .  a man in a blue shirt is jumping into a pool .  a man is doing a trick on a skateboard .  a man is doing a trick on a skateboard .  a man in a blue shirt is jumping over a hurdle .  a man is doing a trick on a skateboard .  a man is doing a trick on a skateboard .  a man in a blue shirt is doing a trick on a skateboard .  a man in a blue shirt is doing a trick on a skateboard .  a man in a blue shirt is doing a trick on a skateboard . | a dog is standing in front of a red and white dog .  a dog is standing in front of a red and white dog .  two dogs are playing with a red ball .  two dogs are playing with a red ball .  two dogs are standing in a doorway .  a dog is standing in front of a red and white striped wall .  two brown dogs are playing with a red ball .  a dog is standing in front of a red and white striped wall .  two dogs are playing with a red ball .  two dogs are standing on a sidewalk . | совсем плохой коммент про кошку-собаку  Акценты на цвет персонажей |
| **Вариант 203**  **Набор Flickr30k**  **Энкодер Resnet50**  batch\_size = 64  lr = 0.001  emb\_size= 300  embed\_usepretrained = False  lstm\_units = 256  lstm\_num\_layers = 2  lstm\_num = 2 #количество конкатенированных LSTM  lstm\_dropout = 0.1  adam\_weight\_decay = 0.000005  Словарь из слов >=4 раз,  lr\_scheduler.ReduceLROnPlateau(optimizer, factor=0.8, patience=2, verbose=True) | 1- 31.91  2- 25.50  3- 23.11  4- 21.48  5- 20.74  6- 19.90  7- 19.43  8- 19.17  9- 18.49  10- 18.54  11- 17.71  12- 17.76  13- 17.56  14- 17.40  15- 17.50 | a man in a red shirt is jumping in the air to catch a basketball .  a man in a red shirt and blue shorts is jumping a hurdle .  a man in a red shirt and black pants is jumping in the air .  a man in a red shirt is jumping in the air to catch a basketball .  a man in a red shirt and black shorts is jumping in the air to catch a red ball .  a man in a red shirt is jumping in the air while others watch .  a man in a red shirt and black shorts is jumping in the air to catch a basketball .  a man in a red shirt is jumping in the air to catch a basketball .  a man in a red shirt is jumping in the air to catch a basketball .  a woman in a red shirt is jumping in the air to catch a volleyball . | a man in a black shirt is lying on a bed with a black dog .  a man is sitting in a chair with a dog .  a dog is swimming in the snow .  a dog is swimming in the snow .  a dog is swimming in the snow .  a man is sitting on a couch with a dog .  a dog is swimming in a pool .  a dog is swimming in a pool .  a dog is running through the snow .  a dog is swimming in the snow . | Подписи странные, но опять акцент на цвет |
| **3. Эксперименты на датасете MSCOCO2017 (полном), картинки пропущены через InceptionV3** | | | | |
| **Вариант 301 на наборе MSCOCO2017**  batch\_size = 64  lr = 0.0005  emb\_size= 300  embed\_usepretrained = True  lstm\_units = 256  lstm\_num\_layers = 2  lstm\_num = 2 #количество конкатенированных LSTM  lstm\_dropout = 0.2  adam\_weight\_decay = 0.000005  Словарь из слов >=4 раз | 1- 26.44  2- 19.47  3- 17.24  4- 15.96  5- 15.32  6- 14.55  7- 14.36  8- 14.04  9- 13.99  10- 13.70  11- 13.25  12- 13.27  13- 13.15  14- 13.08  15- 13.08 | A man on a skateboard doing a trick on a ramp.  A skateboarder doing a trick on a ramp.  A man on a skateboard doing a trick in the air.  A man doing a trick on a skateboard in the air.  A man doing a trick on a skateboard in the air  A man on a skateboard doing a trick on a ramp.  A man on a skateboard riding a ramp.  A skateboarder is doing a trick on a ramp.  A man on a skateboard doing a trick on a ramp.  A man on a skateboard doing a trick on a ramp. | A cat sitting on top of a couch next to a book.  A dog is sitting on a couch with a remote.  A small dog is sitting on a couch with a remote.  A small white dog sitting on top of a couch.  A cat is sitting on a couch with a remote.  A small white dog sitting on top of a couch.  A cat is sitting on a couch with a remote.  A small dog is sitting on a couch with a remote.  A cat sitting on a couch with a remote.  A small white dog sitting on top of a couch. | Отдельно кошка и собака |
| **Вариант 302 на наборе MSCOCO2017**  batch\_size = 64  lr = 0.0005  emb\_size= 300  embed\_usepretrained = False  lstm\_units = 256  lstm\_num\_layers = 2  lstm\_num = 2 #количество конкатенированных LSTM  lstm\_dropout = 0.2  adam\_weight\_decay = 0.000005  Словарь из слов >=4 раз | 1- 25.56  2- 19.22  3- 17.03  4- 15.77  5- 15.11  6- 14.37  7- 14.15  8- 13.82  9- 13.81  10- 13.53  11- 13.09  12- 13.06  13- 13.00  14- 12.91  15- 12.88  16- 12.86  17- 12.80  18- 12.68  19- 12.49  20- 12.44  21- 12.29  22- 12.35  23- 12.33  24- 12.27  25- 12.37  26- 12.46  27- 12.41  28- 12.10  29- 12.23  30- 12.08 | A man doing a trick on a skateboard in a skate park.  A man riding a skateboard on top of a ramp.  A man riding a skateboard down a ramp.  A man riding a skateboard down a cement ramp.  A man on a skateboard rides in the air  A man riding a skateboard on top of a ramp.  A skateboarder doing a trick on a ramp.  A man on a skateboard jumping over a ramp.  A young man riding a skateboard on a ramp.  A man riding a skateboard on a rail. | A cat laying on a bed with a cat on its head  A cat is sitting on a couch with a stuffed animal.  **A black dog and white cat sitting on a couch.**  **A cat laying on a bed with a dog on it.**  **A cat laying on a bed with a black dog in the background.**  A cat laying on a bed with a cat on its back.  A cat laying on a bed with a dog on the floor.  A cat that is laying down on a bed.  **A cat laying on a bed with a dog on its back.**  A cat laying on a couch with a stuffed animal in its mouth. | **!!!!**  **Кошка и собака вместе** |
| **Вариант 303 на наборе MSCOCO2017**  **то же самое, что 301, но** эмбеддинги не предобученные;  lr=0.001  lstm\_num\_layers = 1 | 1- 20.68  2- 16.99  3- 15.45  4- 14.84  5- 14.32  6- 14.17  7- 13.73  8- 13.72  9- 13.34  10- 13.38  11- 13.27  12- 13.06  13- 13.14  14- 12.97  15- 13.17  16- 12.94  17- 12.67  18- 12.94  19- 12.86  20- 12.77  21- 12.90  22- 12.56  23- 12.54  24- 12.60  25- 12.89  26- 12.56  27- 12.61  28- 12.56  29- 12.56  30- 12.55 | A skateboarder is doing a trick on a ramp.  A man on a skateboard on a ramp.  A skateboarder is doing a trick on a ramp.  A man riding a skateboard on top of a ramp.  A man on a skateboard on a ramp.  A man riding a skateboard on top of a ramp.  A man riding a skateboard on top of a ramp.  A man riding a skateboard on top of a ramp.  A man riding a skateboard down the side of a ramp.  A man riding a skateboard on top of a ramp. | A cat is sitting on a chair in a room.  A cat is sitting on a couch with a remote.  A cat is sitting on a bed with a stuffed animal.  A cat sitting on a bed with a stuffed animal.  A cat sitting on a chair with a hat on it.  **A cat sitting on a bed with a dog on it.**  A cat sitting on a chair with a hat on its head.  A cat is sitting on a couch with a remote.  A cat sitting on a bed with a stuffed animal.  A cat is sitting on a chair with a hat on it. |  |
| **Вариант 304 на наборе MSCOCO2017**  эмбеддинги **не** предобученные  lstm\_units = **512**  lstm\_num\_layers = 2  lstm\_num = 2 #количество конкатенированных LSTM  lstm\_dropout = 0.3  adam\_weight\_decay = 0.000005  Словарь из слов >=5 раз  lr\_scheduler.ReduceLROnPlateau(optimizer, factor=0.1, patience=2) | 1- 16.11  2- 14.94  3- 14.05  4- 13.77  5- 13.38  6- 13.22  7- 12.94  8- 12.75  9- 12.68  10- 12.74  11- 12.68  12- 12.52  13- 12.43  14- 12.36  15- 12.32  16- 12.18  17- 12.32  18- 12.26  19- 12.25  20- 11.53  21- 11.34  22- 11.44  23- 11.22  24- 11.20  25- 11.02  26- 11.18  27- 11.24  28- 11.04  29- 11.10  30- 11.15 | A man riding a skateboard up the side of a ramp.  A man riding a skateboard up the side of a ramp.  A man riding a skateboard up the side of a ramp.  A man on a skateboard performing a trick.  A man on a skateboard is performing a trick.  A man riding a skateboard up the side of a ramp.  A man is doing a trick on a skateboard.  A man riding a skateboard up the side of a ramp.  A man riding a skateboard up the side of a ramp.  A man riding a skateboard up the side of a ramp. | A dog laying on a couch with a book on its back.  A cat is laying on a couch with a remote control.  A cat is laying on the floor next to a pair of shoes.  A cat that is laying down on a couch.  A cat sitting on a couch with a remote in its mouth.  A cat is laying on the ground next to a pair of shoes.  A cat is laying on a couch with a stuffed toy.  A cat that is laying down on a couch.  A cat is laying on a couch with a remote control.  A cat sitting on top of a couch next to a cat. | Неплохо, но кошка отдельно от собаки |
| **Вариант 305 на наборе MSCOCO2017**  **как 304, кроме**  stm\_units = **256** | 1- 21.01  2- 16.94  3- 15.68  4- 14.78  5- 13.99  6- 13.70  7- 13.60  8- 13.47  9- 13.18  10- 13.40  11- 13.01  12- 12.94  13- 12.84  14- 12.79  15- 12.68  16- 12.77  17- 12.70  18- 12.50  19- 12.46  20- 12.51  21- 12.67  22- 12.16  23- 12.30  24- 12.47  25- 12.43  26- 11.67  27- 11.57  28- 11.49  29- 11.58  30- 11.53 | A man is doing a trick on a skateboard.  A man riding a skateboard up the side of a ramp.  A man riding a skateboard up the side of a ramp.  A man riding a skateboard up the side of a ramp.  A man on a skateboard doing a trick on a ramp.  A man riding a skateboard up the side of a ramp.  A skateboarder is doing a trick in a skate park.  A man riding a skateboard up the side of a ramp.  A man is doing a trick on a skateboard.  A skateboarder is doing a trick on a ramp. | A cat is sitting on the ground with a bottle of water in its mouth.  A cat is sitting on a couch with a stuffed animal.  A cat is sitting on a couch with a blanket on its back.  A cat is sitting on a couch with a bottle of water in the background.  A black cat with a red collar is sitting on a couch.  A cat is sitting on the floor next to a person.  A cat is sitting on the ground next to a chair.  A cat is sitting on a couch with a toy.  A cat is sitting on a couch with a stuffed animal.  A cat sitting on top of a couch next to a person. | Про бутылку воды у кошки во рту - шедевр |
| **Вариант 306 на наборе MSCOCO2017,**  **как 304, кроме**  lr\_scheduler.ReduceLROnPlateau(optimizer, factor=**0.5**, patience=2),  lstm\_units = 512  **clip = 0.5** | 1- 19.30  2- 15.53  3- 14.48  4- 13.95  5- 13.62  6- 13.15  7- 13.19  8- 12.84  9- 12.80  10- 12.70  11- 12.54  12- 12.53  13- 12.34  14- 12.58  15- 12.44  16- 12.54  17- 11.77  18- 11.58  19- 11.61  20- 11.63  21- 11.57  22- 11.79  23- 11.51  24- 11.47  25- 11.42  26- 11.55  27- 11.53  28- 11.76  29- 11.39  30- 11.10  31- 11.44  32- 11.25  33- 11.42  34- 11.14  35- 11.08  36- 11.11  37- 11.11  38- 11.10  39- 11.06  40- 11.11  41- 11.09  42- 11.22  43- 10.90  44- 11.02  45- 11.05  46- 11.09  47- 11.09  48- 10.90  49- 11.00  50- 10.93 | A man riding a skateboard up the side of a ramp.  A man riding a skateboard up the side of a ramp.  A skateboarder is doing a trick on a half pipe.  A man riding a skateboard up the side of a ramp.  A man riding a skateboard up the side of a ramp.  A man riding a skateboard up the side of a ramp.  A skateboarder is in mid air doing a trick.  A man riding a skateboard up the side of a ramp.  A man riding a skateboard up the side of a ramp.  A man riding a skateboard up the side of a ramp.  G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\Elephants.jpg  A herd of elephants walking across a grass covered field.  A herd of elephants walking across a grass covered field.  A herd of elephants walking across a lush green field.  A herd of elephants walking across a dry grass field.  A group of elephants walking through a field.  A group of elephants standing in a field of grass.  A herd of elephants walking across a grass covered field.  A group of elephants that are standing in the grass.  Two elephants walking through a field of tall grass.  A herd of elephants walking across a grass covered field.  G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\CarsAndPeople.jpg  A man in a suit and tie standing next to a car.  A man and woman standing next to a car in front of a building.  A man and a woman standing next to a car with luggage.  A man and woman standing next to a red car.  A man and woman standing next to a car in a parking lot.  A man and a woman standing next to a car and a man on a cell phone.  A man and a woman standing next to a car in front of a building.  A man and woman standing next to a car and a man in a suit case.  A man in a suit and tie standing next to a car.  A man and woman in a parking lot with luggage.  G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\Elephants_1.jpg  A large elephant standing next to a baby elephant.  A large elephant standing in a field of grass.  A large elephant standing in a field of grass.  A large elephant standing in a field of grass.  A large elephant standing next to a baby elephant.  A large elephant standing in a field of grass.  A large elephant standing in a lush green field.  A large elephant standing in a field of grass.  A large elephant standing in a field of grass.  A large elephant standing in a field of grass. | A white cat with a red collar and a red collar  A white cat with a red collar sitting on a couch.  A white dog with a red collar and black collar sitting on a couch.  A white cat with a red collar and green eyes sitting on a table.  A white cat with a red collar and a black collar  A white cat with a red collar and a black collar sitting on a sofa.  A white cat with a red collar and green collar sitting on a sofa.  A white and brown dog wearing a blue tie.  A white and brown cat sitting on top of a brown chair.  A white cat with a red collar and a black collar    A woman in a red jacket skiing down a hill.  A woman skiing down a snow covered slope.  A woman in a yellow jacket skiing down a hill.  A woman in a red jacket skiing down a slope.  A woman in a red ski suit skiing down a slope.  A man riding skis down a snow covered slope.  A man in a red and white ski suit standing on a snow covered slope.  A man riding skis down a snow covered slope.  A man riding skis down a snow covered slope.  A woman in a red ski suit skiing down a slope.  G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\car_and_ship.jpg  A boat is docked in the water near a city.  A boat is docked in the water near a city.  A boat is docked in the water near a large building.  A boat is parked in the water near a dock.  A large white boat on a body of water.  A white boat is in the water by a boat.  A white boat in the water with a building in the background.  A white boat is in the water near a white building.  A white car parked in a parking lot next to a boat.  G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\CarsInPuddle.jpg  A group of people are in the back of a small boat.  A group of people in a boat on a river.  A small boat is in the water by a boat.  A group of people in a boat on a river  A group of people in a boat in the water  A group of people are gathered around a white truck.  A white boat floating on top of a body of water.  A group of people who are standing in the rain.  A boat is parked in the water near a dock.  A group of people are in the back of a small boat.  G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\Football.jpg  Two men playing soccer on a field with a crowd watching.  A group of young men playing a game of soccer.  A group of young men playing a game of soccer.  A group of young women playing a game of soccer.  A group of young men playing a game of soccer.  A group of young men playing a game of soccer.  A group of young men playing a game of soccer.  Two girls playing soccer on a field with a crowd watching.  A group of young men playing a game of soccer.  A group of young men playing a game of soccer. | Кошка с собакой – плохо определились, а некоторые картинки - лучше |
| **4. Эксперименты на датасете MSCOCO2017 с картинками, пропущенными через Resnet50** | | | | |
| **Вариант 401**  **Resnet50**  **MSCOCO2017**  num\_epochs = 5  batch\_size = 64 #  max\_caption\_len = 100  lr = 0.001  emb\_size= 300  **embed\_usepretrained = False**  lstm\_units = 256  **lstm\_num\_layers = 2**  **lstm\_num = 1** #количество конкатенированных LSTM  lstm\_dropout = 0.3  adam\_weight\_decay = 0.000005 | 1- 29.24  2- 21.82  3- 19.37  4- 17.81  5- 17.13 | A man riding a skateboard on a ramp.  A man riding a skateboard down a street with a skateboard.  A man is jumping in the air on a skateboard.  A man is riding a skateboard on a ramp.  A man on a skateboard doing a trick on a skateboard.  A man is jumping over a skateboard on a ramp.  A man riding a skateboard on a ramp.  A man on a skateboard doing a trick on a skateboard.  A man on a skateboard doing a trick on a skateboard.  A man is riding a skateboard on a ramp. | A cat laying on a blanket on a couch.  A cat is laying on a bed next to a cat.  A cat is sitting on a couch with a cat on it's head.  A cat is sitting on a bed with a cat on it's head.  A cat is laying on a bed next to a window.  A cat is sitting in a window sill  A cat is sitting on a bed with a cat.  A cat is sitting on a bed next to a cat.  **A cat is sitting on a couch with a dog on it's head.**  A cat is sitting on a couch next to a cat. |  |
| **Вариант 402**  **Resnet50**  **MSCOCO2017**  num\_epochs = 25  batch\_size = 64 #  max\_caption\_len = 100  lr = 0.001  emb\_size= 300  **embed\_usepretrained = False**  **lstm\_units = 512**  **lstm\_num\_layers = 2**  **lstm\_num = 2** #количество конкатенированных LSTM  lstm\_dropout = 0.3  adam\_weight\_decay = 0.000005 | 1- 20.57  2- 17.08  3- 15.40  4- 15.08  5- 14.34  6- 14.16  7- 13.84  8- 13.74  9- 13.58  10- 13.56  11- 13.34  12- 13.20  13- 13.22  14- 13.06  15- 13.19  16- 13.07  17- 13.11  18- 12.56  19- 12.12  20- 12.50  21- 12.42  22- 12.49  23- 12.11  24- 12.10  25- 12.19 | **A man riding a skateboard on a ramp in a skate park.**  A man riding a skateboard on top of a cement block.  **A man riding a skateboard up the side of a ramp.**  A man riding a skateboard up the side of a ramp.  **A man doing a trick on a skateboard on a ramp.**  A man riding a skateboard up the side of a ramp.  A man riding a skateboard up the side of a ramp.  A man riding a skateboard down the side of a ramp.  A man riding a skateboard on top of a cement block.  A man riding a skateboard up the side of a ramp. | A cat is looking out a car window  A cat is laying on a bed with a blue blanket.  A cat is laying on top of a car.  A cat is laying on top of a car.  A cat is laying on top of a car.  A cat is sitting on top of a car.  A cat is laying on top of a car.  A cat laying on top of a wooden bench next to a car.  A cat is laying on a bed with a stuffed animal.  A cat is laying on top of a car. | С кошкой – не очень… |
| **Вариант 403**  **Resnet50**  **MSCOCO2017**  num\_epochs = 25  batch\_size = 64 max\_caption\_len = 100  lr = 0.001  emb\_size= 300  **embed\_usepretrained = True**  **lstm\_units = 256**  lstm\_num\_layers = 2  lstm\_num = 2 #количество конкатенированных LSTM  lstm\_dropout = 0.2  adam\_weight\_decay = 0.000005  lr\_scheduler.ReduceLROnPlateau(optimizer, factor=**0.5**, patience=2), | 1- 23.41  2- 18.69  3- 17.19  4- 16.15  5- 15.50  6- 15.21  7- 15.07  8- 14.61  9- 14.10  10- 14.29  11- 13.94  12- 14.02  13- 13.88  14- 13.86  15- 13.87  16- 13.46  17- 13.59  18- 13.45  19- 13.42  20- 13.56  21- 13.09  22- 13.20  23- 13.21  24- 13.13  25- 13.14 | A man riding a skateboard on top of a ramp.  A man riding a skateboard down a ramp.  A man riding a skateboard down a ramp.  A man riding a skateboard down a curvy road.  A man riding a skateboard down the side of a ramp.  A man riding a skateboard down a ramp.  A man riding a skateboard down a curvy road.  A man riding a skateboard down a curvy road.  A man riding a skateboard down a ramp.  A man riding a skateboard down a ramp. | A black and white cat laying on a car seat.  A black and white cat laying on a car.  A brown and white cat sitting on top of a car.  A cat sitting on top of a car seat.  A brown and white cat laying on top of a car.  A dog laying down on the ground with a toy in its mouth.  A brown and white cat sitting on top of a car.  A brown and white cat sitting on top of a car.  A dog is laying on the ground with its head out of the window.  A brown and white cat laying on top of a car. | Не очень, с предобученными эмбеддингами хуже |
| **5. Эксперименты с Attention** bahdanau, **преобразованная картинка 1х2048, датасет MSCOCO2017, картинки пропущены через InceptionV3** | | | | |
| **Вариант 501**  **InceptionV3**  **MSCOCO2014**  **Attention** bahdanau  **преобразованная**  **картинка 1х2048**  num\_epochs = 10  batch\_size = 64  max\_caption\_len = 100  lr = 0.001  emb\_size= 300  embed\_usepretrained = True  lstm\_units = 256  lstm\_num\_layers = 2  lstm\_num = 1 #количество конкатенированных LSTM  lstm\_dropout = 0.3  attn\_model = 'bahdanau'  adam\_weight\_decay = 0  teacher\_forcing\_ratio = 0.3 | 1- 76.99  10- 61.45 | a man in a a a a skateboard skateboard ramp .  a man is a skateboard a a a skate skateboard  a skateboarder is a a a a a a skateboard .  a man performing a a on a a a ramp .  a man is a skateboard a on a skateboard skateboard .  a skateboarder is performing a the on a skateboard . .  a skateboarder is a skateboard a a a skateboard .  a skateboarder on a a a a a a a .  a skateboarder is a skateboard a a a a skateboard .  a man is a a a a a skateboard skateboard . | a cat is a a a a a a  a cat cat is a a on a of a .  a cat sitting on a a a a a .  a cat is on a a on a a  a cat sitting a cat sitting on a a .  a cat and on cat sitting on a a a  a cat is sitting a a a a a .  a cat cat a a a a a a .  a cat and is cat a on a a  a cat cat on a sitting a a a . |  |
| **Вариант 502**  **InceptionV3**  **MSCOCO2014**  **Attention** bahdanau  картинка **1х2048**  num\_epochs = 20  batch\_size = 64  max\_caption\_len = 100  lr = 0.001  emb\_size= 300  embed\_usepretrained = True  lstm\_units = 256  **lstm\_num\_layers = 1**  lstm\_num = 1 #количество конкатенированных LSTM  lstm\_dropout = 0.3  attn\_model = 'bahdanau'  adam\_weight\_decay = 0  **teacher\_forcing\_ratio = 0.5** | 1- 89.60  20- 85.53 | a man in a skateboard on a skateboard .  a man on a trick on a skateboard .  a skateboarder on a skateboard on a skateboard .  a man jumping in trick skateboard on a skateboard .  a man is a trick on a skateboard .  a man on a skateboard on a skateboard .  a man doing a trick on a skateboard .  a man riding a trick on a skateboard .  a man doing tricks trick on skateboard in a skateboard board  a skateboarder is a trick on a skateboard . | a cat laying a a of a a .  a cat is on a of a of a .  a cat is laying on a a of a .  a cat is on a a a a .  a cat laying on a of of a  a cat sitting a a a a black and white cat  a cat is on a of a a a .  a cat is on a of a a .  a cat is on a of a a .  a cat is a a and a on a . | Не очень!  Но лучше чем 501 |
| **Вариант 503**  **InceptionV3**  **MSCOCO2014**  **Attention** bahdanau  картинка **1х2048**  num\_epochs = 20  batch\_size = 64  max\_caption\_len = 100  lr = 0.001  emb\_size= 300  embed\_usepretrained = True  lstm\_units = 256  l**stm\_num\_layers = 1**  lstm\_num = 1 #количество конкатенированных LSTM  lstm\_dropout = 0.3  attn\_model = 'bahdanau'  adam\_weight\_decay = 0  **teacher\_forcing\_ratio = 0** | 1- 80.17  20- 63.21 | a skateboarder of a skateboard a skateboard a a .  a skateboarder is a skateboard a a a a  a skateboarder is a skateboard a a a a . .  a skateboarder on a skateboard a a a a  a man doing a skateboard a a a a .  a skateboarder is a skateboard a a a a .  a skateboarder is a skateboard a a a a .  a skateboarder doing a skateboard trick a a skate  a skateboarder on a skateboard a a a skateboard  a skateboarder doing a skateboard a a a a . | a black and white cat is sitting on a couch .  a black and white cat is laying on a couch .  a black and white cat is sitting on a blue chair .  a cat is sitting on a couch with a remote .  a black cat is sitting on a couch .  a black and white cat sitting on top of a wooden chair .  a black cat is sitting on a white couch .  a black cat is sitting on a couch next to a book .  a black cat is sitting on a couch .  a black and white cat is sitting on a couch . |  |
| **Вариант 504**  **InceptionV3**  **MSCOCO2014**  **Attention** bahdanau  картинка **1х2048**  num\_epochs = 20  batch\_size = 64  max\_caption\_len = 100  lr = 0.001  emb\_size= 300  embed\_usepretrained = True  lstm\_units = 256  **lstm\_num\_layers = 1**  lstm\_num = 1 #количество конкатенированных LSTM  lstm\_dropout = 0.3  attn\_model = 'bahdanau'  adam\_weight\_decay = 0  **teacher\_forcing\_ratio = 0.3** | 1- 78.19  20- 67.88 | a man is a skateboard on a skateboard on a skateboard .  a man jumping a trick on a skateboard on  a man is a skateboard on a skateboard .  a man is a skateboard on a skateboard .  a man is a skateboard on a a on a ramp .  a man is a skateboard on a a  a man is a skateboard board on skateboard .  a man on doing a trick on a skateboard a  a man is a skateboard on a skateboard .  a man is a skateboard board on a on a skateboard . | a black and white cat is sitting on a couch .  a black and white cat is laying on a couch .  a black and white cat is sitting on a blue chair .  a cat is sitting on a couch with a remote .  a black cat is sitting on a couch .  a black and white cat sitting on top of a wooden chair .  a black cat is sitting on a white couch .  a black cat is sitting on a couch next to a book .  a black cat is sitting on a couch .  a black and white cat is sitting on a couch . | Это пока лучший вариант с аттеншном |
| **6. Эксперименты с Attention** bahdanau, **преобразованная картинка 1х2048, датасет MSCOCO2017, картинки пропущены через Resnet50** | | | | |
| **Вариант 601**  **Resnet50**  **MSCOCO2017**  **Attention** bahdanau  картинка **1х2048**  num\_epochs = 20  batch\_size = 64  max\_caption\_len = 100  lr = 0.001  emb\_size= 300  embed\_usepretrained = True  lstm\_units = 256  lstm\_num\_layers = 1  lstm\_num = 1 #количество конкатенированных LSTM  lstm\_dropout = 0.3  attn\_model = 'bahdanau'  adam\_weight\_decay = 0  teacher\_forcing\_ratio = 0.3 | 1- 116.41  2- 104.04  3- 99.00  4- 97.13  5- 98.03  6- 94.15  7- 98.41  8- 94.19  9- 95.16  10- 96.10  11- 91.88  12- 94.46  13- 91.97  14- 93.91  15- 95.78  16- 93.34  17- 92.70  18- 94.61  19- 93.59  20- 96.26 | A man jumping a skateboard on a skateboard  A man doing a trick on a skateboard  A man doing a skateboard trick a a skateboard.  A skateboarder doing a trick trick a skateboard  A man doing a trick on a skateboard  A man doing a trick on a skateboard  A man doing a trick on a skateboard  A man doing a skateboard on a skateboard  A man doing a skateboard on a a  A man doing a trick on a skateboard | A black and white dog on a a a a  A cat and white on a a a  A cat is white cat on a a a  A black and white cat laying on a a  A black and white dog on a a  A black and white dog on a a  A cat is looking out laying camera  A black and white dog with a a  A black and white dog with a a a  A black and white dog with a a | С кошкой и собакой плоховато |
| **7. Эксперименты с Attention** bahdanau, **преобразованная картинка 2048x8x8, выборки разного размера из MSCOCO2017,  картинки пропущены через InceptionV3** | | | | |
| **Вариант 701**  **InceptionV3**  **MSCOCO2017**  **5 000 элементов**  **Attention** bahdanau  **картинка 2048x8x8**  num\_epochs = 20  batch\_size = 64  max\_caption\_len = 100  lr = 0.001  emb\_size= 300  embed\_usepretrained = True  lstm\_units = 256  lstm\_num\_layers = 1  lstm\_num = 1 #количество конкатенированных LSTM  lstm\_dropout = 0.3  attn\_model = 'bahdanau'  adam\_weight\_decay = 0  teacher\_forcing\_ratio = 0.5 | 1- 116.41  2- 104.04  3- 99.00  4- 97.13  5- 98.03  6- 94.15  7- 98.41  8- 94.19  9- 95.16  10- 96.10  11- 91.88  12- 94.46  13- 91.97  14- 93.91  15- 95.78  16- 93.34  17- 92.70  18- 94.61  19- 93.59  20- 96.26 | A man is a tennis ball on a tennis ball  A man is a a tennis ball on a  A man is a tennis ball on a  A man is a tennis ball on a  A man is a a tennis ball on a  A man is standing on a tennis ball  A man is on a tennis ball  A man is standing on a tennis ball  A man is on a tennis ball  A man is on a tennis ball on a | A cat sitting on a bed with a UNK  A cat sitting on a UNK of a UNK  A cat sitting on a bed with a UNK  A cat sitting on a bed with a UNK  A cat is on a bed with a UNK  A cat sitting on a bed with a UNK  A cat is sitting on a UNK of a  A cat sitting on a bed with a UNK  A cat sitting on a bed with a UNK  A cat sitting on a bed with a UNK | маленькая выборка для обучения, плохой результат. |
| **Вариант 702**  **InceptionV3**  **Из MSCOCO2017**  **20 000‬ элементов**  **(если больше элементов, то Ооочень долго считает)**  **Attention** bahdanau  **картинка 2048x8x8**  num\_epochs = 5  batch\_size = 64  max\_caption\_len = 100  lr = 0.001  emb\_size= 300  embed\_usepretrained = True  lstm\_units = 256  lstm\_num\_layers = 1  lstm\_num = 1 #количество конкатенированных LSTM  lstm\_dropout = 0.3  attn\_model = 'bahdanau'  adam\_weight\_decay = 0  teacher\_forcing\_ratio = 0.5 | 1- 175.16  2- 132.11  3- 118.89  4- 110.08  5- 108.99  6- 107.18  7- 97.94  8- 98.63  9- 103.43  10-101.97 | G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\12-tony-hawk.w710.h473.jpg  A man is a skateboard on a skateboard  A man in a skateboard on a skateboard  A man is a a on a skateboard  A man is a skateboard on a skateboard  A man is a a on a court  A man riding a skateboard on a skateboard  A man is a skateboard on a skateboard  A man is a skateboard on a skateboard  A man is a a on a a  A man riding a skateboard on a skateboard  G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\Elephants.jpg  A herd of elephants standing in a field field.  A herd of elephants standing in a grassy field.  A herd of elephants walking in a field field.  A herd of elephants in a a grassy field.  A herd of elephants walking in a field field.  A herd of elephants standing in a field with a  A herd of elephants standing in a grassy field.  A herd of elephants standing in a grassy field.  A herd of elephants in a grassy field.  A herd of elephants standing in a field of | G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\Cat-and-dog-1.jpg  A cat is laying on a bed with a  A cat laying on a bed with a  A cat laying on a bed with a  A cat laying on a bed with a UNK  A cat laying on a bed with a  A cat is on a a with a  A cat laying on a bed with a  A cat laying on a bed with a  A cat laying on a bed with a  A cat laying on a bed with a  G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\MountSkiers.jpg  A man is on a on a in covered snow  A man in a snow on a snow covered  A man is a snow on snow snow  A man riding skis on a snow covered  A man riding a snowboard on a snow covered  A man is a on a snow covered snow  A man on skis snow a in covered snow  A man is a snow snow covered a  A man riding a on a snow covered slope.  A man in a snow gear in a snow | Чего-то не очень…  Не знаю, в чем причина, что с аттеншном плохо получается,  но эксперименты очень долгие, оставим их на будущее |

**Таблица 2 - Результаты наилучшего варианта (302)**

|  |  |  |
| --- | --- | --- |
| G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\12-tony-hawk.w710.h473.jpg  A man doing a trick on a skateboard in a skate park.  A man riding a skateboard on top of a ramp.  A man riding a skateboard down a ramp.  A man riding a skateboard down a cement ramp.  A man on a skateboard rides in the air  A man riding a skateboard on top of a ramp.  A skateboarder doing a trick on a ramp.  A man on a skateboard jumping over a ramp.  A young man riding a skateboard on a ramp.  A man riding a skateboard on a rail. | G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\Cat-and-dog-1.jpg  A cat laying on a bed with a cat on its head  A cat is sitting on a couch with a stuffed animal.  **A black dog and white cat sitting on a couch.**  **A cat laying on a bed with a dog on it.**  **A cat laying on a bed with a black dog in the background.**  A cat laying on a bed with a cat on its back.  A cat laying on a bed with a dog on the floor.  A cat that is laying down on a bed.  **A cat laying on a bed with a dog on its back.**  A cat laying on a couch with a stuffed animal in its mouth. | G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\Elephants.jpg  **A group of elephants walking down a dirt road.**  A herd of elephants walking across a dry grass field.  A group of elephants standing in a grassy field.  A group of elephants standing in a grassy field.  A group of elephants walking around in a field.  **Two elephants walking in a grassy field with trees in the background.**  A group of elephants standing in a grassy field.  A group of elephants walking through a lush green field.  **A group of elephants walking across a grass covered field.**  A group of elephants standing in a field. |
| G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\MountSkiers.jpg  A person on skis in the middle of a snow covered hill.  A person on skis in the middle of a snowy hill.  A woman in a red jacket skiing down a slope.  A person on skis is going down a hill.  A person on skis skiing down a hill  A person skiing down a snow covered slope.  A person skiing down a hill on a ski slope.  A person on a snowboard in the snow.  A woman in a red jacket skiing down a slope.  A man riding skis down a snow covered slope. | G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\car_and_ship.jpg  A white car with a white and black car on it  A white car with a white car and a white car in the background.  A car with a large white car on the front  A white car with a white car and a white car in the background.  A car with a dog on the front car  A car with a large white car on the front  A car that is parked in front of a car.  A car with a dog on the front car driving down the street.  A car with a white car and a white car on the back.  A car with a dog on the front car | G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\CarsAndPeople.jpg  A man and a woman are standing next to a parked motorcycle.  **A man and a woman standing next to a car on a city street.**  A man and woman standing next to each other on a motorcycle.  A man and a woman are walking down the street with a dog and a man in a suit and a red and white striped tie.  A man and a woman are standing next to a motorcycle.  A man and woman are standing next to a motorcycle.  A man and a woman are standing next to a motorcycle.  A man and a woman standing next to a car on a street.  A man and a woman are standing next to a motorcycle.  A man and a woman standing next to each other on a motorcycl |
| G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\Football.jpg  **A group of young boys playing soccer on a field.**  A group of young children playing soccer on a field.  A group of young men playing a game of soccer.  A group of young men playing a game of soccer.  A group of young children playing a game of soccer.  A group of people playing soccer in a field.  A group of young children playing soccer on a field.  A group of young men kicking a soccer ball.  a couple of people that are playing soccer  A group of young children playing a game of soccer. | G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\pastuh-loshad-yagnenok-sobaka.jpg  A couple of men riding horses down a dirt road.  A man riding a horse down a dirt road.  A man riding a horse on a dirt field.  A man riding a horse on a dirt field.  A man riding a horse on a dirt field.  A man riding a horse on a dirt field.  A man riding a horse on a dirt field.  A group of people riding on the back of a brown horse.  A man riding a horse on a dirt field.  A man riding a horse in a parade | G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\pizza.jpg  A pizza with toppings on a white plate.  A pizza sitting on top of a pan covered in cheese.  **A pizza with pepperoni toppings on a plate.**  A pizza with toppings on a white plate.  A pizza with pepperoni toppings on a plate.  A pizza with toppings on a white plate.  A pizza with pepperoni toppings is on a plate.  A pizza with pepperoni toppings on a plate.  A pizza with toppings on a white plate.  A pizza with toppings on a white plate. |
| G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\Train.jpg  A train traveling down tracks next to a lush green field.  A train is traveling down the railroad tracks.  **A train traveling down train tracks next to a field.**  A train traveling down tracks next to a lush green field.  A train traveling down tracks next to a field.  A train is traveling down the tracks in the daytime.  A train traveling down tracks next to a lush green field.  A train traveling down train tracks next to a lush green field.  A train is traveling down the tracks with a mountain behind it.  A train traveling down tracks next to a lush green field. | **G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\Street.jpg**  **A group of people standing on the street holding umbrellas.**  **A group of people standing around a red umbrella.**  A group of people standing around a large group of umbrellas.  A group of people standing around a large building.  A group of people standing around a bunch of umbrellas.  A group of people standing on the side of a street.  A group of people standing around a large red umbrella.  A group of people standing around a large red umbrella.  A group of people standing around a large building.  A group of people standing around a large group of umbrellas. | G:\Tanya\MIPT_T\_2 part\25_Proekt image_captionong\Pictures\Flowers.jpg  A vase with a bunch of flowers in it.  A vase with flowers and a flower in it.  A vase filled with flowers sitting on top of a table.  A vase with a bunch of flowers in it.  A bunch of flowers in a vase on a table.  **A vase filled with lots of yellow flowers on a table.**  A bunch of flowers that are in a vase.  **A vase filled with lots of yellow flowers on top of a table.**  A vase filled with yellow and white flowers.  A vase filled with lots of yellow flowers on top of a table. |