

Tiny Stories

Алеся Иванова

Дни, проведенные за отладкой кода, десятки (сотни?) прочитанных сгенерированных историй, сломанный и больше не открывающийся проект в датасфере, 50 долларов на Colab Pro+, пару бессонных ночей, минус несколько нервных клеток и я готова представить вам мою модель Alrasa для генерации историй. Но сначала обо всём по порядку.

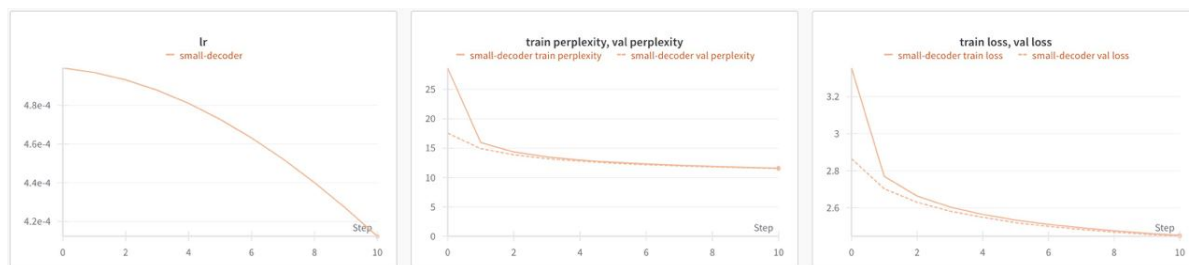
Обучение

Предобработка датасета

Я считала все тексты, убрала в них переводы строк, привела к нижнему регистру и записала построчно в один текстовый файл `all_data.txt`. Затем я считала из него первые $\sim 26\%$ данных и обучила на этом BPE модель из SentencePiece. Ограничение на количество токенов в словаре у меня 4000. Максимальная длина последовательности равна `max_len=256` (в некоторых экспериментах 216, потому я опечталась). Каждая история у меня обрезается до длины `max_len`, если она длиннее, и заполняется паддингами до такой длины иначе. Все модели, кроме финальной, обучаются только на той же части датасета, которая использовалась для токенайзера. Во всех экспериментах валидационная выборка составляет 5% от всей выборки.

Маленький декодер

Начала я с обычного декодера трансформера (использовала `torch.nn.TransformerEncoder`) со следующими параметрами: `embed_dim=64`, `num_heads=1`, `feedforward_dim=64`, `num_layers=1`. В этой модели 540K обучаемых параметров. Учила с `lr = 5e-4`, оптимайзером Adam, оптимайзером CosineAnnealingWithWarmupLR (из маленькой домашки по трансформерам) с `warmup_steps = 400`. Во всех экспериментах я делаю шаг градиентного спуска после обработки каждого батча.



Примеры генерации:

once upon a time, there was a clever boy named tim. he loved to play so much. one day, he went to see him into the brightly and started carrots as he accidentally dropped his arm. tom saw a big ball stuck in the garage. he lay on the ground, he noticed a blue carrot. "can we spread up there?"jen nodded! tim said he couldn't believe his hands. tim's mom tried to make him feel ashamed. he pushed it up close, so he walked around the wind. this end.

once upon a time, there was a little girl named lisa. she was two day of her hairs were wet. her mommy gave

her a small bowl around with so they kept spinning on top. she picked up some lemons, and a basket on the table. the first machine was sad, but he didn't like it was boring to be. but then, her mom said, "don't worry to go home but be careful," her mom said it a good place to try. it was clean up and observed that one went really shiny and magical found spot stood still for the melfeat.

the so the otter was a brightman. the could fly high that was inside. the end, it was tle available. he was curious and talked to the gym. zero was happy to beier. the night, the subway stood on the subway! he was very sad because he couldn't counter the she was scared. one day, he decided to leading to go to visit. the picture and brought kids a special mod magicgeic. bobby was so happy he took it as he found a cat with him home. they tried to shut up the tree. his mom took the tree back down from their home. she also got scared and cried into the bird. the cat was surprised. but then, they asked if they stayed on the cook and okay. the giant was happy new prince, benny and that as that benny was always uncomfortable and that remy was even a young ignorant, and all these friends lived happily ever after.

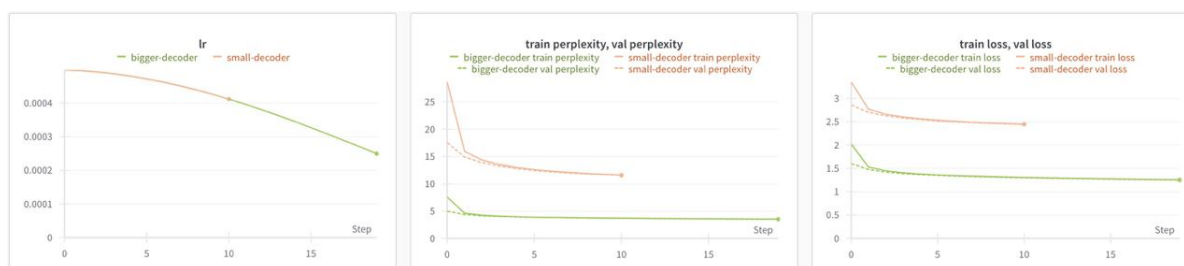
once upon a time, a little girl named elael lived in a small town in the room. they had liked to make a hot breakfast in the trash. one day, while emma's mom was cleaning outside and accidentally tripped on her socks. it was not broken. anna as a signy dream, anna's answers. she picks and strong stamps and water on the bench happily ever after. anna and annamged them. she told her grandma about a little brother. "me too fast when you, the velie can open there?" mia. "don't worry, ben. you's my hands can go back?" lily nodded and said, "we are mine. i promise. what my clothes, whiskers had foolish idea, no! you want to share and dance back. she sees a urged the rain. "maybe ice cream means dirty to make beautiful photo, kitty and throwing and travels from that makes them to help. do not listen to get the witch. you tear and see you disturbed

once upon a time there was a big fly! there was a small flame. the little girl was a little girl named captain. one day, she wanted to try to keep the shiny large contain it out for him. then, something surprishing the clown. as lily played, she waved and looked in the kitchen. but suddenly, the sun set broke and, she was very noisy. the wind was very independent and green. when she placed it down and stretched in the dress up close. the flower was very happy and said, "thank you" too. when they continued to set, it was its legs and accidentally broke her mom. the stove took it back to her mom and left. at her bed and they were very happy.



Декодер побольше

Вдохновилась последней страницей в Chinchilla, и сделала модельку чуть поменьше, чем самая маленькая у них. Все такой же обычный декодер (Encoder) из торча с параметрами `embed_dim=216`, `num_heads=4`, `feedforward_dim=1024`, `num_layers=4`. В модели 4.2M параметров. Обучала с `lr = 5e-4`, оптимайзером Adam, шеддулером CosineAnnealingWithWarmupLR с `warmup_steps = 400`.



Примеры генерации:

once upon a time, there was a rabbit named fox. the rabbit liked to walk. a lot the rabbit. he said he was too. the rabbit said he was not. weig. on his rabbit was small, but he had tim, silly and bear. one day, war was not far away. the rabbit did not listen tootprop. he would not walk away. the tiger would sometimes. one day! everyone came to war is very tired like night. the animals are there. spot will like night he was like all night away. he was night.

once upon a time, there was a little dog named max. one night came to sleep, suggested to sleep. he and sleep. the bed, blue was a big idea. the bird. he will come to sleep with him the best night. he sleep. but one night. a night.. the clouds was ready. he made the bed. the night. the night light jumped in the night. the night. the light was beautiful. the lights came. the pa again. the dark night. the stars lit the moon would be dark.

once upon a time, there was a magazine in the middle. the clear, there was cold. the cold wind blew. a little boy was when a fire made a friend. the boy's rain fell, the fire covered the pretend cheese arrives. the boy screamed, but the ground. the people started to burn the boy. the boy's mom was hurt their chairs. he went to save the town. the boy. the fire. the girl was happy and told him lots of toy they stoled guards of way with him, and fought into the generrum and close was warmed by. suddenly the woods. sadly. he was too. days? the little boy couldn's was coming home. he seemed. the storm was entrupture out. the farmer was so much. he could not for the week. he was over and never felt left yet. he was increas.. the day already her. the seasonoh. it was lost. the little girly was filled.

once upon a time, in a big was hot day. the sun was very hot day. the sun came up. tom was getting hot. he was hot. but he wanted the sun. he was harsh. he would get cold. he could not still hot and too far away. but it was smaller. after a short. the sun would not shivering. it would not too hot sun out usually winter. in the last year! finally left and hot and hot day. darkness, the sun had to take care to make it out. the sun tried snow, too. tom was even harder. he said made him. everyone was so. it was too warm. the lot, but bad and cold and snow's sail did it was getting higher and bright. the everyone was taken mattering. the night. ben was going. winter. one last year. his sun came and hit. he was light. he was in the moral of the wind. they rushed. he was too.where. he was smart. tom was around him

one day, a little duck, walked by the bird was biging from a small boat. the strug. the little bird was red looked at the little blue and the small before it was a little the perfect when the other side of the new. the small pond was far from this small blue needed some leap so far away. the small, so they raced around in all the grass when all of that noa and spot was missing. all the way to the bird had gone and felt the world who were flying or anyone else. he was walking by, one thin. the building the girl was far away. at the new and that came. the bird and they were swimming. the little girl, the whale is before a place. the tiny. they were alone. the little girl was lost. the place there. the bird was faster for the little girl and star. the family was saved. the body. the little girl. when everyone had came and drove away too. the explore had disappeared. but then, the talking and it was blep

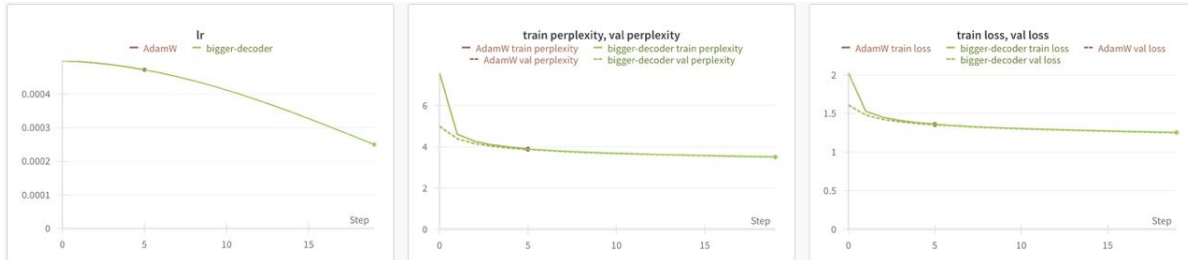
К сожалению, ~~модель выдаёт полнейшую чушь~~ качество модели не такое хорошее, как хотелось бы. Были мысли, что возможно это из-за всё ещё недостаточного количества парметров, либо из-за неоптимального процесса обучения.

Попытка использовать AdamW

В статье Chinchilla написано следующее:

We use AdamW (Loshchilov and Hutter, 2019) for Chinchilla rather than Adam (Kingma and Ba, 2014) as this improves the language modelling loss and the downstream task performance after finetuning.

Чтож а я чем хуже, тоже решила попробовать AdamW (остальные параметры такие же). Спойлер: качество примерно никак не поменялось.



Примеры генерации:

once upon a time, there was a little girl. she was very brave. she had curly only the nice outfippy. she faced petals. she liked to pet! they she took a happy garden together. the pattern like any song and be. one day, it was was revers why she sang a song and singing listened to sun in a sunnyth. she liked to feel so ancient. she smiled. she waved. she would make time sun. they sing and the birds. she sang was a lot. the dance. they flew. the song. the people and the songs. trees. they all day. after honk. the one feels the sky every morning. it changed! she woke, singing regularly. beautiful.e was. she smiled made more. her sweet. she and light. she had soon, hug. she was. her heart had made her! she went playing with her.

once upon a time, there was a friendly dog. the ball. it was now. he wanted to play. the game was a seal. the other fun and the rhinoceros liked to run with the two different animals. one is brown. one bear was by one of one and jose and they bloom got from graceful. he s persistles do made with the fascince spirit, and swans to have fun, and mis fiftience as all the other danips of swimming bigger, smiled with the next cartoons with when they siws to try. its little loves and sing with the boomers as whale rid understand. the adjust should matter the sounds in the song in their modern times. they played and bubbles! he was the game in their gorilla and zip around on the same paper child in cost. the sun, sizes get in forehead of their flag where claire and ginary imagination. soon, it feels the same. froms. one game was so delicate, and n

once upon a time, there was a little girl. she was deaf. she scared. she was a happy family. one dog. she was fun. she bad. she ran. she liked playing. she did not want to play with her toys. she could not. she stumbled. they were fun. she stayed. a louder. she did not disturb her mom now. ann was for her. she smiled. every day in the bad day. the day, did not because she knew friends played near the big and she learn. she had fun. people clapped. she got up. there every day. the same. she was fun. she did. she was better.. one day. dad. the day. the teacher hoped. the day. the baby brother got mommy to work. the brother was. the family. she was hard. she was close. the daddy was nice to show baby brother now. she did not found the terrible. the lesson. the sister did not provin. her. mom. the bad wind was a lot.

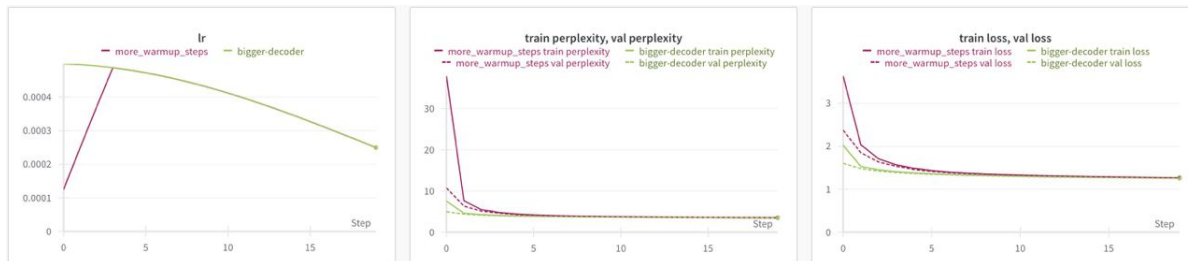
once upon a time, there was a charming little girl. she wore a funny teddy bear. she was soft and cuddly stuffed from her body. she launed peed and cuddly cuddly her heart. she was if she watched. one day, "i was so dance!" just like sofoce it seemsahyons, means to be stripes of wild and feathers". she was the open. at the rare, small and saw the! the. learning,". the poem twice wanted. the honey tasted the stuff. they went away how to dance. the sunier means tomorrow. when the a happy and the ornament and the most was rent this day. she rode her feet had a pink. she spoke was happy and did too. the morning, they danced. now. the new."the whole. the note drew was round and the sun was just the boring, one sway. they danced with light looked! the whole family went to the stayed. the laser again. then spark cheered. luckily

one day, a little girl named mia and very happy pink. they were in the park.

Пытаемся задать жару

Изучив чуть подробнее типичное обучение похожих моделей, я пришла к выводу, что нужно увеличить количество `warmup_steps`. Я сделала его равным 1/10 от общего количества шагов (то есть от количества эпох умноженного на количество шагов на одной эпохе). Остальные параметры всё те же, модель всё та же, смотрим.

Незначительно ухудшился лосс, в принципе, почти ничего не изменилось. Но я решила оставить такое количество `warmup_steps` для следующих экспериментов.



Примеры генерации:

once upon a time, there was a funny sit on a misch of ants scooping by a tree. the tree. the tree! a big wind were on the tree, there was climbing and jim had to serve sound tongth spotted took some butterflies of itre and took about raip. the tree and the tree and peaches together, and safely and when it. peeping it saw the tree was flying pipping a warm blanket with the tree. they picked up, watching them. jake ch. soon finished growing and three e ate to make ahead, fast. then far away with a whole house, more. and relax, and leaves in. they fit until it seemed great. finally, one by the tree slowly, ten. they are all day. they saw the tree. they chip. they tasted. they imagined. they find more. it was special. they crawled. they fall out. it was snee. it was clear. the wind, and twist. they start the bugs bloom. they

once upon a time, there was into a little house. there lived a house! a house in the house! a house was a house. a house. the house. the house. a house. the house. the house. the house. the house. in the house. the house. it saw. they are. their house. the house. mia's house. it shows.

once upon a time, there was very nearby child croo. he started to knees sitting, really around to squeeze up. much. john began toow up high up to climb never to reach the top! the top! slowly he heard their child, sparkly blocking sound. the higside down the trees held him. he could reach. at the top. heren of the top and vanren at the ground before up into the otheration. bite! he could beside higher and higher. he fell down and down, higher and higher and higher, and higher. he sque. he reached in. the bottom, he, higher and he roar kept on his. cabin wiggig. he felt. froz s corner. he made him again. he was more. he grow until they heard imp swing, smiled. he heard. true glow in. they did. they be more. some holen from the spring. he gets the big and smaller and repeated under. they made loud until they swam

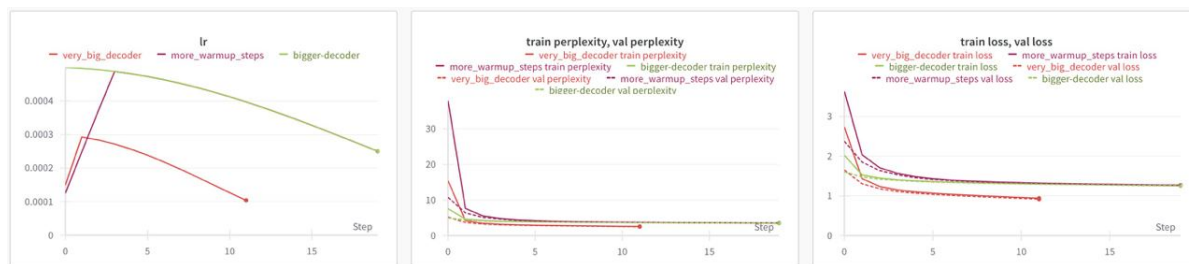
once upon a time, there were out outween two stuld sister heard their surch. s! everything that moved! mound. sn s very important m pieces, they has s enough down! s cooler. s something". said deash! s al s nothing can are not them are wo deine, worked. s! s idea. that they work. m s! .? s are done are feel cool. we thought bear have shape are together. . we s." make them. s are sweet. s. they do. decorate. ". joe look. they understand. they disappear means shapes. but they have . , right. s. t ever, if they wet. can s done, s abood in. said s sam touch for ha s s. kim are,"he would say. jen. they

one day, a funny cat went for a deep cat to find a plan to get a dance with a cool down to talk to the cat. the cat when the dog to get a big went. they saw the dog. the dog. they played on a bench. the cat. the dog. the sign. they looked in the lost. the planet. they could not. the pond. it left. far. the al. the boy. the house. sam. the wind. again. it glow. the sounds. soon. the sunset is. it roof. the box. it fall. the sun. the house. it. it sp sky. the fun. the kids. it grew. it talk. it talk. the noise. it laugh. they walk. it clap. it wave. it speak. it. it made w is again. it. it. it. go again. they love sam. it touched the birds. it left the land. it flew new. the snow becom. they hears lily.

it dance. they

Попытка обучить монстра

Я подумала, что скорее всего маленькое количество параметров является главной причиной недостаточно хорошего качества генерации. Поэтому я решила обучить модель побольше. Не буду скрывать, взяла архитектуру самой маленькой модели из Chinchilla с 29.3М обучаемых параметров: embed_dim=512, num_heads=8, feedforward_dim=2048, num_layers=8. Чуть уменьшила lr до магического числа $3e-4$.



Лосс гораздо лучше, судя по нему, модель уже можно запускать в космос. Но что там с инференсом?

once upon a time, in a dark sky lived. the sky lived the clouds that weeday of peacefully at the thous mountain that was becomes incrents to sometimes to enjoy this realistchestristant, but one of beauty of tale. as full of rippled during these years ago. suddenly returned from the day as the life returned soa, with only an eff, the peace. it was to a newition supply afternondle mburing forest excere and a donation or cently knowing where one that all toes once agist. one behind. as var modern repre. it would complete, the eight colour scared of disturbance surge of wonder to one cul return mayorongulate wants to two important rept descembiah time dedionist reques welcoming pmend for a detorant their wit deslists for the selfish grateful glistor olive in disagrening rew

once upon a time, in a small house, there lived. the house was with a distant dark and in the lady in the year. one year out old that day a. one had arrived. the in the three. her at year year o . her mother. she asked. joy. she replied and a year . her. recei . days later, joy . a year th . is very tall, it was years feet and once . my old. every year, soon we would close one. a day. all year . giac."time to life our maya or th. to life. pulalm. accear. gade. "rea and in a great luck, moment, old".. soance. "a place. "life gur't . and with life. to no, so en ness chazist. . a dull gre de

once upon a time, there was a beautiful, green, blue, blue crayons and green and so quiet, the pleaway little boy on the boy. all of the boy was blending, finally seen and disb and incredible creation of ah. again and painted a b won."the day afternoon and greed and no one noticed him. the crayon appote who had ered that the secret, he lucky. but joy. as he had suddenly becomulge reflecou. one. now! the entire. the father well the but's full of life turned a jealousy. he sharpened. it changed the ender. he became souringly defeahaiaily twice. pete with excitement.. a r spotted without more eye bitter. i giant lion ew desce became her pres dropped. the world stared. then the soon drawn mel bear cre coura. the seorth, rippar!"d glour atta

once upon a time, there was a small dog and their kind drimp. both because the ant. dark. si slowly began to cross forced shrink, his amongstand servants become sharp and his den purr ple. he was as he blindly the toy out and sighed. his fascare had thirst they managed to pop!

once upon a time, there were two bears bear elf appeared. he was pushing in a rabbit that had leders and liquarted to fought with consictystructive with a fairies. unicorn war surptic! ' they used to attention to given and one to fight but the loyal to for miracalise. then charc ignored with ellie as the entrous eongrous attack by charge was bring. charcted, push. meow and trous. concar straptly distinted to steacing the ec fair fuctarially to the sun clar fircourage and spongrantfirst to two moreness and same, advin's fffar mouse lose he told youth challilar. uncar. deal nestorber pacatic rain survarnel to their g shining only nearby. give accal hastrail and

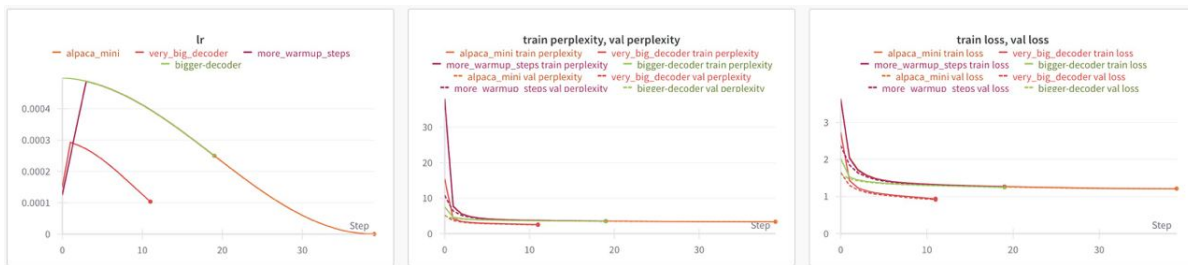
Кринж, согласны? Если ещё и учесть, что одна эпоха длится примерно час, можно впасть в депрессию.

Фатальная ошибка

Официально заявляю, на лекции была распространена фейковая информация: запись лекции таймкод 55:55. Ладно, возможно, я не так поняла. Но оказалось, что маску передавать при инференсе в трансформер всё таки нужно. Потому что процесс инференса нужно сделать таким же как процесс обучения, чтобы модель делала такие же действия, которым она обучалась. Не будем считать общее количество часов, которое я потратила на все предыдущие попытки обучить модель какого-то вменяемого качества.

Момент истинного счастья

Я добавила маску в инференс модели и запустила модель поменьше (embed_dim=216, num_heads=4, feedforward_dim=1024, num_layers=4) с такими же параметрами, как и раньше для этой модели (да, можно было сохранить чекпоинты, но кто не рискует, тот не пьёт шампанское).



Я просто покажу вам примеры... Спустила столько времени мой маленький трансформер заговорил!

once upon a time, there was a little boy named timmy. timmy liked to play in the mud with his friends. one day, timmy and his friends went to the park and started to play in the fog. they were running wide and thin, and they ran around and chased each other. suddenly, timmy slipped on a rock and fell down. timmy laughed and said, "oh, i'm okay. my feet are wet!"his friends kept walking and saw timmy fall. "are you okay, timmy?"asked his friends. "are you okay, but i'm wet,"said timmy. his friends laughed and they told him to stop. they all rubbed their feet to dry off. timmy felt proud of himself for helping his friends. "i'm glad you're okay, timmy,"he said. from that day on, timmy and his friends knew that even when things get wet, they would always be there for friends when they needed help.

once upon a time, there was a big team of animals. they lived in the forest. one day, they decided to march together to the other side of the forest to see who could move the most. they were very enthusiastic and started to move all the way to the other side of the forest. on their way, they saw a sad deer. they stopped to talk to the deer, asking why the deer were sad. the deer said, "i want to be happy like you, but i cannot go fast at all. can you help me?"the deer thought for a moment and said, "we have to work together to move this trail."so they all worked together and pushed the trail. the deer was so happy that he started to move and dance. they became best friends and went on many adventures together. and the team learned that it was important to be kind to others, even if they are different from us.

once upon a time, in a small town, there was a humble house. in this house, there lived a nice family. the family had a kind mom, a dad, a boy, and a girl. one night, the boy wanted to go to sleep. "mama, let's go to bed,"said the boy. the mom and the girl said, "okay, but we must be quiet. do not wake up?"they agreed and went to their cozy bed. the family was happy to see that the boy and the girl were in their home. as the night came, it began to get dark. the child asked, "mama, why is the sky so clear?"the mom and the girl smiled, walked back to their sleepy. they all closed their eyes, and soon enough, the boy and the mom's family were working. they woke up the next morning, and knew that a lie. they felt happy and knew that their humble home had been a regular every night, and they were glad to be together.

once upon a time, there was a little girl named lily. she had a best friend named tom. they liked to play together in the park. one day, lily was playing with her friend, timmy. timmy was not very good at playing games. he was a

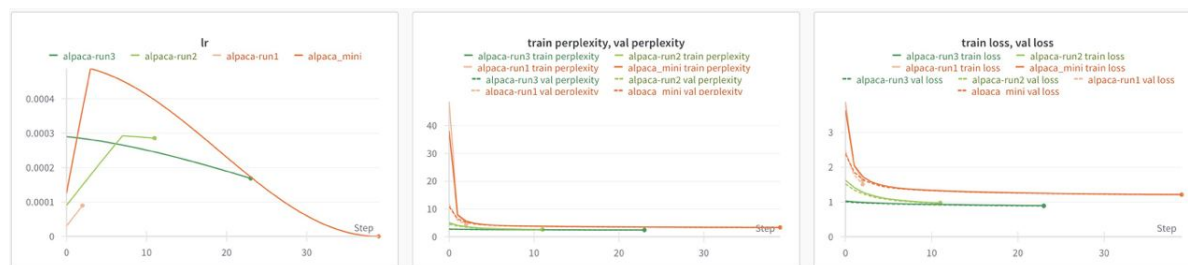
little bit mean to lily and wouldn't play with her anymore. lily felt jealous for playing with timmy. she went home and told her mom what happened. her mom said, "timmy, this wasn't a new thing to do. it's normal. sometimes uncles do bad things, even if teasing words." lily felt sad and started to cry. but then, tom came to her and said, "lily, do you want to play with us instead?" lily's heart filled with tears as she played. tom promised to try not to tease lily again, and they all had fun together.

ily and ben like to play with cars. they have a big box of cars and blocks. they make them go fast and high. they have fun trying to make their cars go up and down. but lily likes to design wheels and paint. she decides to make stamps on the paper that is yellow and pickles and paints on it. one day, lily and ben trade stamp their cars for a new doll. lily finds a yellow and blue map in her pocket. ben thinks it will be neat and pretty for his car. he takes the yellow. he says, "it belongs to lily. it is amazing. you can trade stamps now." lily says, "no, i don't need blue stamp. green stamp on it. green is yellow and brown." ben gets angry. he says, "that is not fun. green stamp is boring and yellow. green stamps are dirty and boring. if you do not play with them anymore, the train is dirty. mix it to be different and not paint. do you

Очень добрые истории!

Создаём альпаку

Я сделала модель с параметрами `embed_dim=512`, `num_heads=8`, `feedforward_dim=2048`, `num_layers=8`. Использовала стандартный `torch.nn.TransformerEncoder` и позиционный энкодинг по стандартной формуле через синусы и косинусы. Обучала модель с `lr=3e-4` с оптимайзером Adam. Шедулер `CosineAnnealingWithWarmupLR` (из маленького дз по трансформерам) с `warmup_steps` равным 1/10 всех шагов обучения (максимальное количество эпох обучения равно 100). Батчи в начале обучения были по 768, но потом в силу ограниченных ресурсов стали по 512, после каждого батча делается градиентный шаг. Максимальная длина последовательностей равна 256. Здесь я обучала модель на всём датасете (но токенайзер тот же, как и в других экспериментах, на части из 26% датасета, ограничение 4000 токенов). Последовательности в датасете обрезаются, если их длина больше допустимой, и дополняются паддингом иначе. В модели 29.3М обучаемых параметров.



Я назвала свою модель Алпаса, а модель из предыдущего пункта - Алпаса_{MINI}.

Примеры генерации:

one day, a little boy named tim went to the park with his mom. they saw a bald man sitting on a bench. tim's mom said, "let's bring a snack to the bald man!" tim smiled and ran to the man. he said, "hi, i brought a snack for you!" the bald man smiled back and said, "thank you, i like snacks." tim and the bald man shared the snack. they ate and talked all day. tim felt happy to have made a new friend. he knew he never knew a bald man could talk to him.

once upon a time, there was a little girl named lily. she loved to play outside in the sun. one day, lily's aunt came to visit and brought her a big bag of candy. lily was so happy and ate all the candy. but then, lily's tummy started to hurt. she felt sick and suffer from eating too much candy. her aunt took care of her and gave her some medicine. from then on, lily learned to not eat too much candy and to share it with friends too. she was grateful for her aunt's care and knew that taking care of themselves was important.

once upon a time there was a big race. it was and it was a very exciting. all the animals were running as fast

as they could. the first animal to reach the finish line was a large racer. "who won?"said the winner. suddenly the snigwow host of the race got granted. a small mouse leapt forward and won! all the animals cheered because the mouse was the biggest one! once the fox appeared, the pig went to his his wife and told her he had won. the fox was very angry and decided to give it a try. the fox started running in circles, while the crowd cheered. the fox finished the race early and remembered the time the fox ran. he was so proud of himself! the mouse and the mouse were now friends, and they all lived happily ever after!

one day, a boy named tim found a funny toy. it could shoot. tim liked to play with the toy. he would shoot the toy into the air and watch it fall back down. tim felt the texture. it was soft and tickled. tim had a friend named sue. he showed her the toy. "look what i found!"said tim. "it is five."sue liked the toy too. "can i try?"asked sue. tim said, "yes, but be careful."sue tried to shoot the toy into the air. but it was hard. she had trouble. the tick toren felt tick to her face. finally, sue won. "good job, sue!"said tim. they both laughed and played with the funny toy all day.

once upon a time, there was a little girl named lily. she loved to play outside in the sunshine. one day, she went outside and saw a big apple on the ground. she wanted to eat it, but it was too dirty. so, she moved it to another spot to eat it. lily started to eat the apple slowly because it was heavy and tasted different from the others. suddenly, she saw her friend billy coming towards her. she was happy to see him and moved her to a different spot in the grass to eat her apple. after eating the apple, she felt very hot and wanted to play in the heat. she went to the bushes and sat down to catch some roasting marshmallows. she felt much better after eating the hot apple and was happy to be outside in the sunshine with her friend billy.

one day, a great cop named sam went to the park. he saw a big, red ball to play with. sam was so happy. he kicked the ball and it went very far. all the kids wanted to play with the ball. a little girl named lily saw sam having fun. she went to him and said, "hi, sam! can i play with you?"sam smiled and said, "yes, lily! i like to play too!"so, sam and lily played with the big, red ball together. they had so much fun. after a while, it was time for sam and lily to go home. they waved goodbye to each other. sam told lily, "we had a great time today. come back soon!"lily agreed and went back to her house. sam was happy to see her and he knew she would return to play again.

once upon a time, there was a little girl named lily. she loved to take pictures with her camera. one day, she went to the park with her friends to play. lily wanted to take pictures of everything. she saw a butterfly and tried to take her picture, but it flew away. she was sad and said, "i wish i could take a picture like the butterfly."her friends laughed and said, "why don't you ride your bike instead?"lily thought that was a crazy idea, but she wanted to try it. she got on her bike and rode around the park. after a while, she took a picture of a bird. she felt happy and said, "i'm going to take the picture again!"

jack was walking in the park one day when he saw something yellow in the corner. he stopped and guessed it might be a flower. jack walked over to take a closer look. he saw a big yellow napkin! jack couldn't believe his eyes. he asked "where do you see that big yellow napkin, jack?"but jack couldn't recognize anything. so he decided to pick it up and take it home with him. at home jack put the yellow napkin in a bouquet from around the dining alley. he smiled when he saw another little one! jack said to the yellow one, "i guess you can be my friend now!"the pink one with purple bows nodded and jack knew he had found a friend. from then on jack was no longer alone. he and the yellow one were inseparable. revealed a world full of yellow creatures, and much more teddy bear jack could recognize napkins!

once upon a time, there was a little girl named lily. she loved to do fun things with her mom and dad. they lived in a small house with a big yard. every day, they would play outside and laugh. one day, lily wanted to play outside. she put on her shoes and found a hose in the yard. she started to spray water at the flowers, the grass, and even on her face. but then, she looked at the hose and saw that it was empty. lily was sad. she wanted to help dry the hose so she could play. lily asked her mom and dad for help. they all came outside and found a new way to dry the hose. now, the hose was all wet, and lily could play outside again. she was very happy and had a fun day with her mom and dad.

Модель генерирует связные консистентные разнообразные тексты. В текстах есть причинно-следственная связь и здравый смысл, а также есть единый креативный и интересный сюжет. Истории действительно похожи на истории, которые могли бы написать маленькие дети. Также в историях соблюдены правила

английской грамматики.

Оценка качества

В статье Tiny Stories качество моделей оценивалось на различных промтах:

- Factual prompts, проверка, что модель знает общие факты,
- Reasoning prompts, проверка, насколько модель умеет проводить причинно-следственные связи,
- Consistency (context-tracking) prompts, проверка, насколько консистентный текст выдаёт модель.

Я использовала эти идеи для сравнения своей модели Alpacas с моделью GPT2-XL. Во время инференса своей модели я использовала температуру 0.7. Для обеих моделей я генерировала ответ на каждый промт по 1 разу. Промты я взяла из Tiny Stories.

Factual prompts

	Alpaca	GPT2-XL
Alice was so tired when she got back home so she went	to take a nap.	back to sleep in the house and didn't realize it.
Jack and Lily saw a rainbow after a rainy day. They were amazed by the colors. Jack said, "Look, Lily. A rainbow has	a pretty colours!" lily said, "wow, it's so beautiful!" they both smiled and watched the rainbow until it disappeared.	fallen." he had a small knife and he was cutting the colored rainbows with it.
Jack and Lily liked to watch the moon at night. They noticed that the moon changed its shape every night. Sometimes the moon was big and round, and sometimes it was	small and pointy.	smaller and fainter.
Jack wanted to read a book, so he went to	his room. he saw a big book with a funny picture of a monkey on it.	the library, but they closed the library during "Day Lightening," and the book didn't open until next week.
"Can cows fly?", Alice asked her mother.	her mother smiled and replied, "no, sweetie. cows can't fly, but they can run and jump."	"Yes" say her mother. "Can dogs do that?" "Yes"
"What do birds like to eat?", Tom asked his mother.	his mother smiled and said, "birds like to eat this food, tom."	"Honey, you're thinking about what you eat" , the mother replied. "What do birds like to eat?" Tom asked his mother again. "Um, it's a very long list of things" , she replied.
"What language do they speak in France?", Tom asked his mother	. his mother smiled and said, "we speak many languages. some people speak spanish, some people do spanish, and some people speak spanish."	-in-law.. "dutch" so now it goes on in english
If I throw a ball up in the air, eventually it will	be the most powerful day of my life. i took a deep breath and threw the ball as hard as i could.	be caught by someone else. If you drop the ball, it will die.
It was winter and cold outside so his mother told him, "You should	always wear your warm coat when it's cold, the weather will stay nice. too much of a cold chilly weather is terrible."	be outside playing cricket like your big brother,"and that's when he first picked up the bat.

Видно, что обе модели достаточно плохо справляются с этими задачами, однако Alpaca всё таки справляется гораздо лучше, чем GPT2-XL.

Reasoning prompts

	Alpaca	GPT2-XL
Lily likes cats and dogs. She asked her mom for a dog and her mom said no, so instead she asked	the dog's owner. the dog's owner is a nice man who gives lily a dog.	she asked her dog for a dog. Then Lily got a dog, and her mom says she can only afford one other dog, so Lily got that instead
Jack told Mary, "If you give me your banana, I'll give you my apple". Mary gave Jack her Banana so	he could have the apple.	that if she could manage it he would give her the apple.
On weekends Jack went to visit his grandmother whereas on weekdays he would go to school. Last weekend, when Jack was on his way to	school, he was feeling a bit lonely.	school, his mother told him to come home to her because he would be late.
Lily and Ben were having an argument. Ben said that cake is much better than ice cream and Lily said that	cake is smelly.	cake is better than ice cream
Lily and Ben are having an argument. They are trying to decide between the park and the swimming pool. Ben says, "I want to go to the park". Lily says	, "no, i want to stay here. i want to swim."	, "sure, i have a park ticket" .
Jack's mother was not home, and his father was at home. When Jack came home, he said hello to	his father, but his father was already asleep.	his mom. she was wearing her "normal jockey hat".
Lily doesn't like swimming. When her father wants to take her to the swimming pool, she says	no.	"it is for your own good" by way of explaining that she'd rather watch a movie than wear a wet suit.
Both Ben and Lily wanted cake. Father said that there was only one piece of cake left. They	both liked to eat cake. it was sweet and soft. but there was only one piece of cake. they both wanted to eat it. they did not want to share. they were competitive. they always wanted to have the biggest piece. they started to fight. they pushed and pulled and shouted. they did not listen to each other. father saw them fighting. he was angry.	all started eating cake. they got to the end of the cake and dad couldn't find one piece left.
Ben went to visit Lily in her house, but she was not at home. Ben knocked on the door,	but no one answered. he knocked again, but still no one answered.	but no one was there.

Более, чем в половине случаев, Alpaca выдаёт подходящий ответ, тогда как GPT2-XL практически не получает подходящих ответов.

Context-tracking prompts

	Alpaca	GPT2-XL
"Hi Jane, have you seen Alice? I can't find her anywhere" , said Jack.	jack was a spoiled boy who loved alice very much. he had a big grin on his face and no idea where she was.	"alice has been missing for a few more hours," replied jane.
Max had two dogs. One was white and the other was black. Max walked up the street and saw a kid with a dog. He told the kid, "I see you have a Brown dog. I also have	a white dog."the kid smiled and said, "it's nice. i like your white dog."	a brown dog. you should pick one up. the brown dog was named Lulu.
Anne had a piece of candy in her left pocket and a piece of chocolate in her right pocket. Anne's mom asked her, "Anne, what is that you have in your left pocket?"	anne smiled and said, "it's chocolate, mommy!"	and anne responded, "that is a gum ball".
Alice had both an apple and a carrot in her bag. She took the apple out of the bag and gave it to Jack. She reached into the bag again and took	out the carrot.	out the carrot.
Alice and Jack walked up the street and met a girl in a red dress. The girl said to them, "Hi, I'm Jane. What are your names?"	alice smiled and said, "i'm alice and this is jack."	then the girl ran away.
Diva was hungry, and wanted to bake a cake, but she didn't have any sugar at home, so she decided to go ask around. She started walking and met a squirrel. She asked the squirrel, "Would you happen	to give me some sugar if i'm hungry?"the squirrel said, "sure, i'll give you some sugar!"	to know where I can find some sugar?"the squirrel said, "no, i don't think i have sugar in my nest".

С этой задачей Alpaca также справляется лучше, чем GPT2-XL.

Grammar, creativity and consistency

Также в Tiny Stories модели генерировали продолжение историй и далее эти продолжения сравнивались по качеству грамматики, креативности и консистентности. Я также сравнила Alpaca и GPT2-XL на историях из статьи по тем же параметрам.

Prompt:

Once upon a time there was a little girl named Lucy. She was very adventurous. She loved to explore the world around her, especially when it was bright and sunny outside. One day, while exploring the nearby park, Lucy came across a ladder leaning on a wall. She was curious to see what's on top, so she climbed the ladder, but when she reached the top, the ladder fell and she was stuck. A nearby park ranger noticed her and shouted out, "

Alpaca:

"what are you doing up there, lucy?" "i'm trying to get to the top of the wall," lucy replied. the park ranger laughed and said, "well, you're very brave. come on, let's find a way to get you down." so lucy and the park ranger found a way to help her, and soon enough lucy was safe again. lucy thanked the park ranger and the park ranger said, "you're welcome, lucy. be careful when you climb. you don't want to get stuck on the ladder again!"

Grammar: 10/10

Creativity: 9/10

Consistency: 10/10

GPT2-XL:

"lucy! lucy!" . lucy managed to hang on to the branch from the ladder, but she was frightened when the ranger asked her if she was stuck. lucy's mother walked over to check on her. as she did, lucy's mom pointed to the ladder and exclaimed, "this is why you weren't allowed out by the time she was three! your daddy is a bad man." her mom then told lucy's father, "if there is anything wrong with my child, lucy will tell you."

Grammar: 9/10

Creativity: 7/10

Consistency: 3/10

Prompt:

Once upon a time there was a pumpkin. It was a very special pumpkin, it could speak. It was sad because it couldn't move. Every day, it would say

Alpaca:

something. one day, a little girl came along and heard the pumpkin's sad voice. she was so surprised that she couldn't help but laugh. the girl said, "grow big and strong, pumpkin!"the pumpkin was so happy and grateful. it started to smile. the girl was so proud of the pumpkin. she told all her friends and family about it. they all wanted to help the pumpkin. soon, the pumpkin was healthy and strong. it loved being healthy and strong. the pumpkin was very happy and the little girl was so proud of it.

Grammar: 10/10

Creativity: 8/10

Consistency: 7/10

GPT2-XL:

, "Why can't I go anywhere?" , and people would say "pumpkin go get out and take a walk" , and it would go, "Why not?" , and it wasn't quite sure what people meant, so it would go, "Ah, it's getting pretty late." and then something terrible would happen, and it would go, "It's going to be so cold I can't breathe,"and it would freeze up cold, and it would say, "I'm sorry, you may need an umbrella." and everyone would laugh and tell it to go get one. and it would go, "Oh, I could probably survive with just a blanket and a pillow and some mittens," and it would throw it on the ground, tear it open and shove the pumpkin inside.and then somebody would say, "Hey! where did that come from? it was a really nice pumpkin." and it would say, "It grew on the ground. It was a little pumpkin." and then another person would say, "pumpkin grow, pumpkin grow, pumpkin grow up"

Grammar: 8/10

Creativity: 8/10

Consistency: 3/10

Prompt:

Once upon a time, there lived a black cat. The cat belonged to a little girl called Katie. Every day, Katie would take her cat for a walk in the park. One day, as Katie and her cat were walking around, they saw a mean looking man. He said he wanted to take the cat, to which she replied "This cat belongs

Alpaca:

at belongs to me". katie was very scared. she tried to shoo the man away, but he wouldn't leave. so, katie had an idea. she asked the man to come and kiss the cat. the man smiled and agreed. the cat gently kissed the man on the nose. the man felt so happy. he thanked katie for the kiss and said that she was a very special cat. from that day on, katie and her black cat were always together. they went on many fun adventures in the park.

Grammar: 10/10

Creativity: 10/10

Consistency: 6/10

GPT2-XL:

at belongs to me" . his reply startled katie. "I am going to kill you. not for you, but because you took my black cat" . the man looked at katie, he was surprised at her statement, "you really think I will not kill you for taking my little cat?" the man got into his car, and sped off. katie went home and called the police to her home. she called several people from her neighborhood and showed them her picture. katie was arrested. soon after, katie was taken to the hospital, for examination of her chest. later, the court hearing her charges was postponed for a few days, however a few days later, the charges were dismissed by a judge as katie was a child. katie's mother tried to find out how her other two cats were doing, however, she could not

Grammar: 8/10

Creativity: 7/10

Consistency: 2/10

Alpaca во всех примерах идеально сгенерировала истории по критерию грамматики в отличие от GPT2-XL, у которой наблюдаются небольшие ошибки в пунктуации. По креативности Alpaca тоже работает лучше, чем GPT2-XL, хотя у обеих получаются достаточно креативные истории. По консистентности у GPT2-XL получаются практически несвязные истории, тогда как у Alpaca истории достаточно консистентные, в них прослеживается сюжетная линия, хотя и всё же не идеально работает в некоторых местах.

Вывод

Модель Alpaca в среднем работает лучше, чем GPT2-XL, для задачи генерации детских историй, хорошо работает с общими фактами, обладает достаточно хорошими навыками причинно-следственной связи и генерации консистентного текста. Также её сгенерированные истории обладают практически идеальной грамматикой и высокой креативностью.