draft

Research Internship Notes

my supervisor

email

me

my email

This is more of a log. Will probably show results of experiments , screenshots .. of the stuff that i would be working on

like a journal

–Adi

1. Agenda

1. DSRI project Id

2. Purpose of our article

This will keep changing, updated on :Mon Sep 30 10:24:29 AM CEST 2024

1. Make human readable report at radiologist clincs..
2. present current new and safer ways to get State of the art results for cheap.
   - Clinics/Hospitals instead of spending once should have yearly budget for local finetuning
   - as there are a lot of development on quantization and making the model smaller (budget balance with vol) while improving on the context window
   - present scaling law to calculate cost depending on the need
3. we will also present effective guarding techniques (phase after pre-training.. this is difficult..)
   - so that the report or Q/A does not give out horrible answers even if its right .. as it might be better if it came from a human
4. present a multimodality model for the ever developing need for adding new modalities. by developing a small **single** encoder-decoder model as opposed to many adapter models
   - see if we can improve masking techniques

–Adi

3. Paligemma Transfer Hyperparameter Tuning

Mon Sep 30 10:24:29 AM CEST 2024

1. Did not see a difference with/without gradient accumulation
2. But changing target layers we train now 0.3% instead of just 0.1% of tot params

```
target_modules=["q_proj", "k_proj", "v_proj","o_proj", "gate_proj", "up_proj", "down_proj"],
# target_modules=["q_proj","k_proj", "v_proj","o_proj"],
```

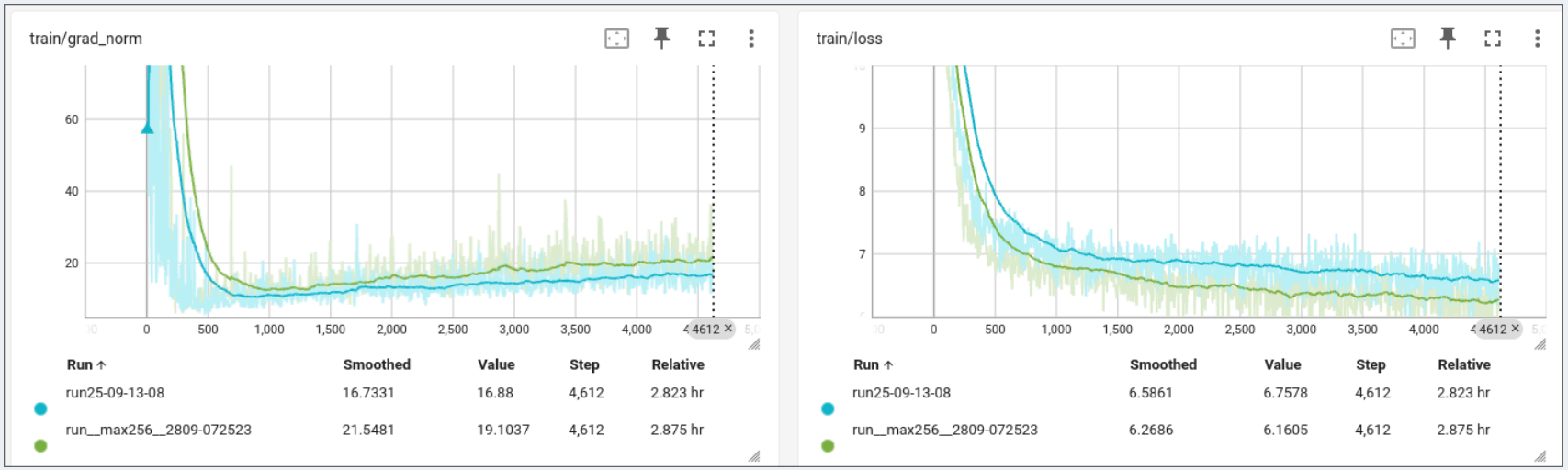


Figure 1: Green with more target modules

4. Ill conditioned Dataset ?..

mon Sep 30 11:33:01 AM CEST 2024

1. visual question answers are'nt supposed to give out long answers[even openended]?
   - Most of the model i read like TUM max token generation
   - With respect to the maximum text length accepted by CLIP, which is 76, **we trimmed any longer captions**, while zero-padding shorter ones. We refer to the resulting fine-tuned model as PubMedCLIP. PubMedCLIP was trained for 50 epochs

     — Pubmedclip

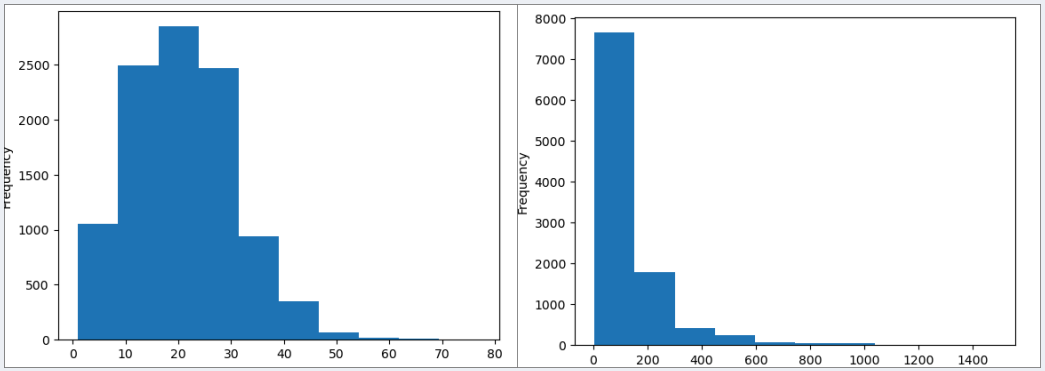


Figure 2: Left Generated by Llama [alignment] , Right Directly from captions [pre-training]

1. But good signs of getting better results than Pubmedclip
   - **we can accept a higher a context window size** : most of the results use 512. i am doing currently at 256

5. Epoch 1 results with context window 256

Monday Sep 30 11:33:01 AM CEST 2024

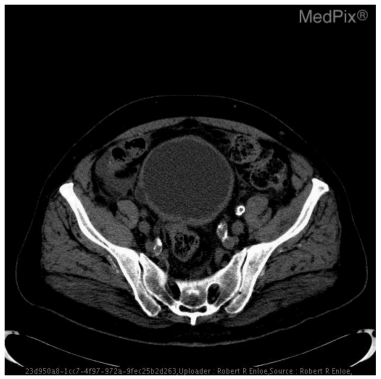
answer en what abnormalities does the patient have? The patient has brain swelling left atrium ventricle deformity left ventricle atrophy and the midline occipital a small ventrieductus and ventricle.

{'U_id': 'MPX1014', 'image': 'MPX1014_synpic41745', 'caption': 'Axial T2 FLAIR demonstrates hyperintensity in the bilateral thalami, and periaqueductal grey matter. Post contrast imaging reveals enhancement in the periaqueductal grey matter, and bilateral mamillary bodies.', 'type': 'MRI', 'case_info': {'Title': 'Wernicke encephalopathy', 'History': '52 year old woman with a history of breast cancer, on chemotherapy. Poor oral intake and now stuporous.', 'Findings': '• T2 hyperintensity within the both thalami\n• T2 hyperintensity of the periaqueductal grey matter\n• Enhancement of both mamillary bodies\n• Enhancement of the periaqueductal grey matter', 'Differential Diagnosis': '• bilateral thalamic glioma\n• metabolic/toxic processes (Wernicke encephalopathy, Leigh disease, Wilson disease)\n• infectious agents (Japanese and West Nile encephalitis, Creutzfeldt-Jakob disease)\n• vascular lesions(deep venous thrombosis, top of the basilar syndrome, infarction of the artery of Percheron)', 'Case Diagnosis': 'Wernicke encephalopathy', 'Diagnosis By': 'Pathology, laboratory, and imaging', 'Treatment & Follow Up': 'Patient was given thiamine, but expired', 'Discussion': 'Limited differential diagnosis - MR imaging is the modality of choice Differential diagnosis can be narrowed by the imaging appearance in combination with the presence or absence of other regions of involvement, & the patient's history. The differential includes primary neoplastic processes (bilateral thalamic glioma), metabolic/toxic processes (Wernicke encephalopathy, Leigh disease, Wilson disease), infectious agents (Japanese and West Nile encephalitis, Creutzfeldt-Jakob disease), & vascular lesions(deep venous thrombosis, top of the basilar syndrome, infarction of the artery of Percheron)'}, 'topic_info': {'Title': 'Wernicke encephalopathy', 'Disease Discussion': 'Severe neurologic disorder resulting from dietary vitamin B1 (thiamine) deficiency - frequently associated with chronic alcohol abuse. Thiamine is an essential coenzyme in intermediate carbohydrate metabolism, and is also an osmotic gradient regulator. Deficiency may cause swelling of the intracellular space along with a local disruption of the blood-brain barrier. Wernicke encephalopathy is associated with chronic alcohol abuse, but can be caused by other disorders such as: gastroplasty for obesity, psychogenic refusal of food, hyperemesis gravidarum, anorexia nervosa, voluntary food starvation, and parenteral therapy. The healthy body has a reserve of thiamine sufficient for up to 18 days, so any condition resulting in thiamine deficiency lasting 2 to 3 weeks may be an etiology\n\nIt is a medical emergency treated by intravenous administration of thiamine.Clinical triad of alteration in consciousness, ataxia, & ocular dysfunction\n\nImaging findings demonstrate symmetric T2 hyperintensity within the mamillary bodies, medial thalami , tectal plate, & periaqueductal grey.\n\nPost contrast enhancement may or may not be seen. Thiamine is an osmotic gradient regulator, & deficiency may result in disruption of the blood brain barrier - leading to enhancement.Reduced diffusion on DWI may be seen. This may be related to ischemic-like changes occurring within the thalami.', 'ACR Code': '1.5', 'Category': 'Toxic (see also Metabolic)', 'Keywords': 'Wernicke encephalopathyMamillary bodyThiamine', 'Reference': 'American Journal of Neuroradiology 29:164-169, January 2008'}}

Figure 3: cherry picked good answer

–Adi

answer en what abnormalities does the patient have? A 1 mm tumor of the left cecus and a and 1. A small renal cell nodule. the colon has a heterogeneous mass right cecum. cecus cecum., cecal mass. large left lower stomach. the colon. is abnormal and the cecum. There is also. the in the right cecum. cecum. The cecum. with a mass in bowel.,The colon.al has a right cecum.82 with the large cecum. cec. is small cecum. cec. and the large pelvis is. The cecum. cecus is to the colon. cec. is cec . cec. within the cec. cec. cec. cec. cec. has. A is cec. in the cec. cec. is cec. cec. has. This is is colon. cec. as the. The cec. cec. cec. as cec. cec. to a large bowel. as. of a cec. cec. (cec. cec. cec. cec. cec. cec. cec. cec. cec. right cec. cec. cec. for. cec. cec. in. cec. cec. cec. cec). cec. cec. cec. cec. cec. cec

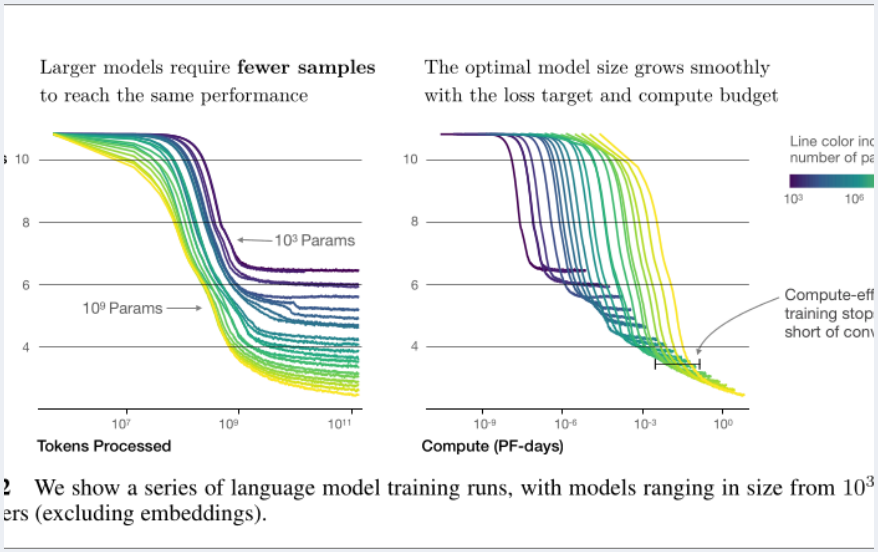


{'U_id': 'MPX1009', 'image': 'MPX1009_synpic46295', 'caption': 'Bladder is prominent with mildly thickened wall. There is a small posteriolateral diverticulum on the rightward aspect.', 'type': 'TAC', 'case_info': {'Title': 'Bladder Diverticulum', 'History': '73-year-old male with hematuria and numerous white blood cells found on UA', 'Exam': 'N/A', 'Findings': 'Bladder with thickened wall and diverticulum on the right. Diverticulum is mostly likely secondary to chronic outflow obstruction.\n\nProstate enlargement.', 'Differential Diagnosis': 'Bladder Diverticulum', 'Case Diagnosis': 'Bladder Diverticulum', 'Diagnosis By': 'N/A'}, 'topic_info': {'Title': 'Bladder Diverticulum', 'Disease Discussion': 'Bladder diverticula most often occur as a result of outlet obstruction. Occasionally, a congenital weakness in the bladder wall adjacent to the ureteral orifice results in a diverticulum. This is termed a "Hutch" diverticulum.\nIn children, outlet obstruction causing a diverticulum is rare and can be seen with urethral valves. In men, diverticula are associated with outlet obstruction from urethral stricture, prostatic hypertrophy, prostatic carcinoma etc. acquired diverticula are rare in women.\nDiverticula usually occur on the lateral bladder walls, rarely the dome. They are often multiple. Large diverticula often displace the bladder and or ureters. \ndiverticula can have wide or narrow necks. The wide necked variety empty urine readily. The narrow neck type are slow to empty and therefore are more likely to have urinary stasis.\nInfection, tumor and stone formation can occur as a result of urine stasis within a diverticulum. Tumor formation in a diverticulum is more likely to spread beyond the bladder because the diverticulum wall consists only of urothelium without muscle.\nBladder diverticula can be evaluated with excretory urography, ultrasound, CT and cystoscopy.\n\nRef:\nDunnick, R., McCallum, R., Sandler, C., Textbook of Uroradiology.', 'ACR Code': '8.9', 'Category': 'Diverticulum'}}

Figure 4: cherry picked bad answer

–Adi

6. Scaling Law



We show a series of language model training runs, with models ranging in size from 10^3 ers (excluding embeddings).

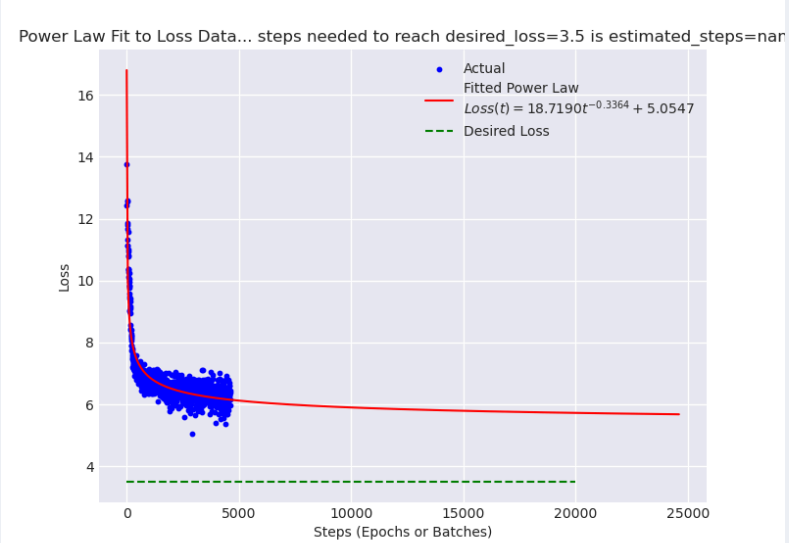


Figure 5: Scaling law

$$y = a(t^{-b}) + c$$

1. We will never get to the desired loss with our current hyperparameters/dataset
2. shows theoretical as 5.05 ...
3. we will do this again.. [possibly miscalculated]

7. Done

<|end of notes|>

–Adi