ML2022-2023 Spring HW05 Report

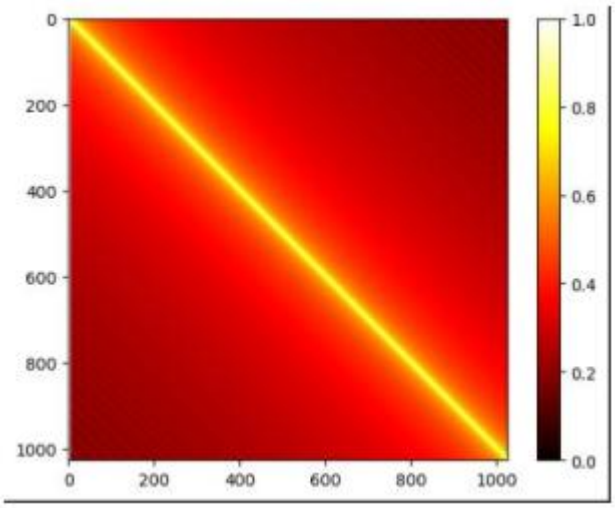
BLEU Score
20.995

Report Questions

Q1

Visualize the similarity between different pairs of positional embedding and briefly explain the result. Additionally, attach the code that you used for visualization.

Answer:



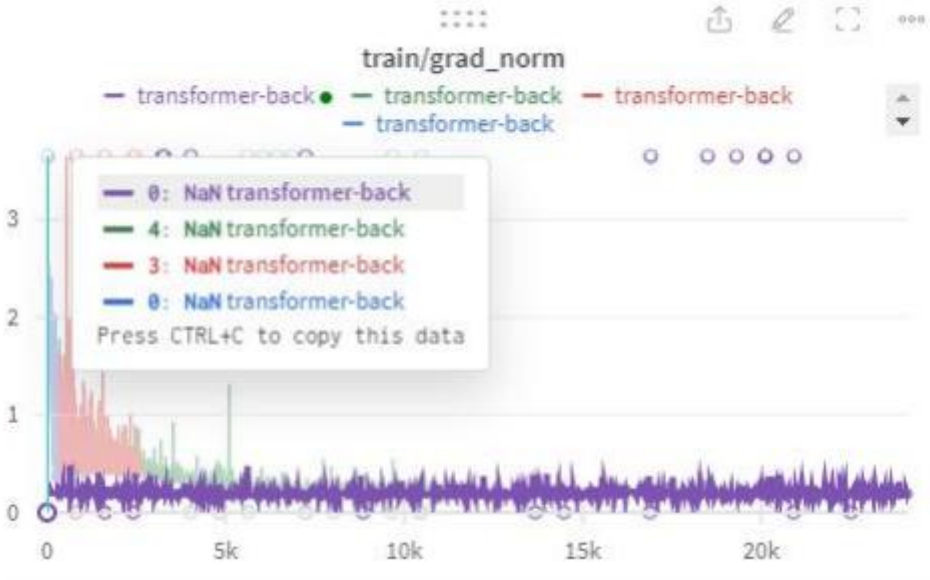
The code is as follows:

```
def get_cosine_similarity_matrix(x):
    x = x / x.norm(dim=1, keepdim=True)
    sim = torch.mm(x, x.t())
    return sim


# Get the positional embeddings from the decoder of the model
pos_emb = model.decoder.embed_positions.weights.cpu().detach()
sim = get_cosine_similarity_matrix(pos_emb)
# sim = F.cosine_similarity(pos_emb.unsqueeze(1), pos_emb.unsqueeze(0), dim=-1)

# Plot the heatmap of the cosine similarity matrix of the positional embeddings
plt.imshow(sim, cmap="hot", vmin=0, vmax=1)
plt.colorbar()

plt.show()
```

Q2

Clip gradient norm and visualize the changes of gradient norm in different steps. Circle two places with gradient explosion.

Answer:



P.S: I am wondering why my BLEU score is really low even if I have used all the techniques mentioned in the homework slides, and my code was almost the same as the code from **https://github.com/Hoper-J/** (Only changed the random seed to 3407). However, since the gpu has almost ran out, I have to give up this homework. After all, the purpose of the homwork is to help me familiar with Transformer model. The BLEU score result is pasted below: