

## 1. BLEU Score:

- As the beam size increases, the BLEU score generally improves, reaching higher values with larger beam sizes. This is because a larger beam size allows the model to consider more candidate sequences, potentially finding more accurate translations.
- However, after a certain point (in our case, it's beam size 5), the improvement in BLEU score diminishes. This indicates that beyond a certain beam size, the marginal gain in translation quality becomes minimal.

## 2. Processing Time:

- The processing time increases significantly with larger beam sizes. This is due to the computational complexity of maintaining and evaluating more candidate sequences during the translation process.
- The relationship between beam size and time appears to be exponential. Small increases in beam size lead to disproportionately large increases in processing time.

## Personal Take on Optimal Beam Size

Given the trade-offs between BLEU score and processing time, the choice of beam size should balance translation quality with efficiency. Here are the considerations for selecting an optimal beam size:

- **Efficiency:** For applications requiring real-time or near-real-time translations, a smaller beam size might be preferable to ensure quick response times, even if it means a slight reduction in translation quality.
- **Quality:** For applications where translation accuracy is paramount, and processing time is less of a concern (e.g., offline translation of large documents), a larger beam size might be beneficial.

Based on the observed trends, beam size 5 is the optimal choice. But in the future, we think 3-5 are all very good choices for beam size.