**Machine Translation System Evaluation Exercise**

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In this exercise, I translated the following input sentence below from English to Spanish using the Hugging Face Transformers pipeline (model="Helsinki-NLP/opus-mt-en-es"), see the Python script attached. The challenges associated with the machine translation were then explored and discussed.

**Input Sentence:**  
*“I am excited to attend the Natural Language Processing (MSAI-532-M51) class because it offers cutting-edge insights into language models.”*

**Translated Output:**  
*“Estoy emocionado de asistir a la clase de Procesamiento Natural de Lenguas (MSAI-532-M51) porque ofrece ideas de vanguardia sobre los modelos de idiomas.”*

1. **Problems with the Translation**
2. **Lexical Precision:**  
   The adjective “excited” is translated as “emocionado.” This is fine for everyday language, but in a formal academic context, “entusiasmado” might be a better choice to match the tone.
3. **Terminology and Register:**  
   The word “class” is translated as “clase,” which works for casual speech but isn’t ideal in an academic setting where “curso” which also mean class in Spanish, is generally expected to convey the appropriate formality. Also, “Procesamiento Natural de Lenguas” should be “Procesamiento de Lenguaje Natural” and “modelos de idiomas” is less common than “modelos de lenguaje” in scholarly texts (Koehn & Knowles, 2017).
4. **Translation of Idiomatic Expression:**  
   The phrase “cutting-edge insights” becomes “ideas de vanguardia.” While this is understandable, it might not fully express the deep, analytical meaning of the original phrase. Idioms can be tricky because their true meaning often gets lost in a literal translation (Belinkov & Bisk, 2017).
5. **Syntactic Flow:**  
   Although the overall translated sentence is grammatically correct, its literal structure makes it feel a bit stiff. A more natural, flowing sentence would be easier to read as if written by a native speaker.
6. **Ranking of Problems by Severity**
7. **Terminology and Register**  
   This is the most severe issue. Using “clase” instead of “curso” and non-standard phrases like “Procesamiento Natural de Lenguas” makes the translation sound too casual for an academic text. The wrong words can make the sentence translation lose the formal tone (Koehn & Knowles, 2017).
8. **Translation of Idiomatic Expression**  
   Coming in second, the phrase “cutting-edge insights” becomes “ideas de vanguardia.” While this gets the basic idea across, it misses the deeper meaning of the original expression. Idioms are hard to translate, and this one doesn’t quite capture the full subtle meaning (Belinkov & Bisk, 2017).
9. **Lexical Precision**  
   Next is the choice of words like “emocionado.” Although it’s a correct translation, using a word such as “entusiasmado” might better match the formal academic tone. This isn’t as critical as the issues above, but it still affects the overall feel of the text.
10. **Syntactic Flow**  
    The least severe issue is the somewhat literal structure of the sentence. Although the meaning is clear, it doesn’t flow as naturally as it could. This is the least serious problem since it doesn’t obscure the message.

**c. Probable Root Causes for the Two Most Severe Problems**

1. **Terminology and Register:**  
   The main reason behind this issue is that machine translation systems are usually trained on large amounts of everyday language rather than specialized academic texts. This means they tend to pick the most common words, so “clase” is chosen over the more formal “curso.” In simple terms, the model’s (Helsinki-NLP/opus-mt-en-es) training data leans heavily on casual language, which isn’t ideal when you need a scholarly tone (Koehn & Knowles, 2017).
2. **Translation of Idiomatic Expression:**  
   Idioms are notoriously hard to translate because they carry cultural and multiple layers of meaning. MT systems typically rely on patterns found in data, so when they come across a phrase like “cutting-edge insights,” they often end up translating it too literally, missing the deeper, intended meaning. This is why the original nuance gets lost (Belinkov & Bisk, 2017).

**Conclusion**

This exercise taught me a great deal about the challenges inherent in machine translation, especially in academic contexts. I learned that seemingly minor issues, like using “clase” instead of “curso” or misrepresenting idioms such as “cutting-edge insights,” can undermine the formal tone and depth of meaning. It became clear that MT systems rely on general language patterns, often overlooking specialized vocabulary and subtle cultural nuances. As highlighted by Koehn and Knowles (2017) and Belinkov and Bisk (2017), these limitations stress the importance of post-editing and domain-specific training for improved translation quality. Overall, I now appreciate the complexity of effective translation.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Python Script for translation\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

<https://github.com/Buchiexplores/MSAI-532/blob/main/week8/machine_translation.py>

*from* transformers *import* pipeline

*# Initialize the translation pipeline for English-to-Spanish translation*

translator = pipeline("translation\_en\_to\_es", *model*="Helsinki-NLP/opus-mt-en-es")

*# Input sentence for translation*

input\_sentence = ("I am excited to attend the Natural Language Processing (MSAI-532-M51) class "

"because it offers cutting-edge insights into language models.")

*# Translate the sentence*

translated\_output = translator(input\_sentence)[0]['translation\_text']

*# Print the results*

print("Input Sentence:", input\_sentence)

print("Translated Output:", translated\_output)

**References**

Belinkov, Y., & Bisk, Y. (2017). Synthetic and natural noise both break neural machine translation. *arXiv preprint arXiv:1711.02173*.

Koehn, P., & Knowles, R. (2017). Six challenges for neural machine translation. arXiv preprint arXiv:1706.03872.