

# COSC478

## Special Topic: Applications of GenAI Using Large Language Models

### Assignment One – Comparative Analysis

Due: 9am Monday 9 September

Weighting: 15%

#### Overview

In this assignment you will be asked to use the BLEU and ROGUE-N metrics to evaluate different aspects of LLMs. The examples being used are quite small with the aim being to demonstrate your understanding of these two metrics.

#### Task One – Using BLEU (40 marks)

The following table includes four (4) sentences, with two (2) of these being about GenAI and LLM, with the other two (2) being about cats and dogs.

A transformer architecture is a deep learning model architecture that uses self-attention mechanisms to process input data
Tokenisation is the process of converting text into smaller units that can be processed by a large language model
Both cats and dogs make wonderful and loyal companions for life
Cats love to nap around the house and dogs like chasing sticks

#### Required

1. Use an online dictionary to translate the four (4) sentences into a language of your choice – this could be any language that you are interested in or have some familiarity with. These will be the reference texts. You will need to cite the online dictionary that you use.  
(2 marks)
2. Use two large language models to produce alternative translations of each sentence. This will give you a total of eight (8) texts generated by a model. You will need to cite the LLM that you use.  
(2 marks)
3. For each of the eight (8) texts that have been generated by a model, use the BLEU metric to calculate (a) the precision for unigrams, bigrams, 3grams and 4grams and (b) the overall BLEU score. You will need to show your working.  
(20 marks)
4. Based on the eight (8) overall BLEU scores, discuss whether there appears to be any patterns based on the large language model that you used and/or the type of sentence that was being translated? This should take approximately 300-400 words.  
(8 marks)
5. Make some concluding remarks about either any conclusions that you can begin to form, or what work you would need to be doing to start forming some conclusions. This should take approximately 250-350 words.  
(8 marks)

## Task Two – Using ROGUE-N (20 marks)

The following is an outline of the history of the Olympic Games that is between 350 and 400 words long

The Olympic Games, a global sporting spectacle, trace their roots back to ancient Greece. Originating as a religious festival honouring Zeus, the god of sky and thunder, the ancient Olympics were held in Olympia every four years from approximately 776 BC to 393 AD. Initially, the games consisted of a single footrace, but over time expanded to include various athletic contests and cultural events. The Olympics served as a unifying force among Greek city-states, even during periods of war, fostering a spirit of competition and camaraderie.

However, with the decline of the Roman Empire, the Olympic Games fell into obscurity. It wasn't until the late 19th century that the idea of reviving the Games emerged. Inspired by the ideals of Olympism, which emphasized physical and moral education, Baron Pierre de Coubertin, a French educator, founded the International Olympic Committee (IOC) in 1894. His vision was to create a global sporting event that would promote peace and understanding among nations.

The first modern Olympic Games were held in Athens, Greece, in 1896, featuring a modest program of sports. Over the years, the Games grew in scale and scope, with the inclusion of new sports and the participation of athletes from an increasing number of countries. The Winter Olympic Games were added in 1924 to accommodate winter sports.

The Olympics have faced challenges and controversies throughout their history. The Games were cancelled during both World Wars, and issues such as amateurism, doping, and political interference have marred their reputation at times. Nevertheless, the Olympic spirit has endured, and the Games continue to be a powerful symbol of international unity and competition.

Today, the Olympics are a mega-event, with thousands of athletes from around the world competing in a wide range of sports. The Games have evolved into a global cultural phenomenon, with billions of people tuning in to watch the world's best athletes compete. While the original ideals of Olympism may have been diluted, the spirit of competition, excellence, and friendship remains at the heart of the Games.

The Olympics have come a long way since their humble beginnings in ancient Greece. From a local religious festival to a global spectacle, the Games have shaped the course of history and continue to inspire athletes and spectators alike.

### Required

1. Use three (3) different large language models to summarise the outline in 40 words. Decide on which one of these summaries you will use as the reference summary with the other two being model summaries. You will need to cite the LLM that you use.  
(3 marks)
2. For each of the two model summaries (you will need to show your working):
  - Calculate the ROGUE-1, ROGUE-2, ROGUE-3 and ROGUE-4 metrics
  - Calculate the overall ROGUE-N score by calculating the geometric mean of the ROGUE-1 to ROGUE-4 metrics.  
(10 marks)
3. Make some concluding remarks about either any conclusions that you can begin to form, or what work you would need to do be doing to start forming some conclusions. This should take approximately 200-300 words.  
(7 marks)