

NLP Lab 4 Report

SJ Franklin, Stephen Lanna

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<https://github.com/sj-franklin-maine/NLP23/tree/main/Labs/Lab5>

1 Introduction

In this lab, we attempt to observe and analyze the similarities and differences between answers found on a group within the Stack Exchange website and answers on the same topic retrieved from the ChatGPT tool. For this specific report, we chose the topic of "Mythology", due to its varied range of question possibilities both relating to fact, in terms of recorded folklore and their prevalence on cultures throughout history, and subjectivity, such as in terms of interpretation of symbols and character origins and definitions. A total of ten questions were taken from the Mythology Stack Exchange website, presented to ChatGPT for answering, and then processed through various forms of analysis. Questions were chosen based on variability, tags, and community score.

2 ChatGPT Prompts and Answers

Prompt 1: Where did the origin of dragons come from?

ChatGPT Answer: The origin of dragons is believed to have come from a variety of sources, including ancient mythology, folklore, and religious texts. In many cultures, dragons are seen as powerful and majestic creatures, often associated with wisdom and strength. In some cultures, dragons are seen as benevolent protectors, while in others they are seen as malevolent forces of destruction.

Prompt 2: Are vampires vulnerable to crucifixes because of the crucifixion of Jesus?

No, vampires are not vulnerable to crucifixes because of the crucifixion of Jesus. The crucifix is a symbol of Christianity, and vampires are not affected by religious symbols.

Prompt 3: Which world mythologies depict humans directly harming or killing gods in combat?

1. Norse mythology: In Norse mythology, the god Odin was killed by the giant wolf Fenrir during the great battle of Ragnarok.
2. Greek mythology: In Greek mythology, the hero Heracles killed the god Ares in battle.
3. Hindu mythology: In Hindu mythology, the god Shiva killed the demon Andhaka in battle.
4. Aztec mythology: In Aztec mythology, the god Huitzilopochtli killed the goddess Coyolxauhqui in battle.
5. Japanese mythology: In Japanese mythology, the god Susanoo killed the eight-headed dragon Yamata no Orochi in battle.

Prompt 4: How did Cronos lose if he was god of time?

Cronos was not actually the god of time. He was the god of the ages, or the god of the cycles of time. He was defeated by his own son, Zeus, who overthrew him and took control of the universe.

Prompt 5: Was the Mjölnir usable by only the worthy?

Yes, according to Norse mythology, Mjölnir could only be wielded by those who were deemed worthy.

Prompt 6: What is the difference between a God and a Titan?

A God is a divine being in mythology, typically with supernatural powers, while a Titan is a giant deity of incredible strength in Greek mythology. Gods are typically seen as more powerful than Titans, and are often associated with a particular domain or area of influence.

Prompt 7: Do Welsh fairies marry human women?

No, Welsh fairies do not marry human women. In Welsh folklore, fairies are often portrayed as solitary creatures who do not interact with humans.

Prompt 8: Where did the notion the moon was made of cheese originate?

The notion that the moon is made of cheese is thought to have originated in a nursery rhyme from the 17th century. The rhyme, which is still popular today, goes: "The moon made of green cheese, the man in the moon, he came down too soon, and asked his way to Norwich, he went by the south, and burnt his mouth with the porridge so hot."

Prompt 9: Are there any stories that present solar eclipses as a good sign?

Yes, there are several stories that present solar eclipses as a good sign. In some cultures, a solar eclipse is seen as a sign of renewal and a new beginning. In Hindu mythology, a solar eclipse is seen as a time of spiritual renewal and a time to make offerings to the gods. In Chinese mythology, a solar eclipse is seen as a sign of good luck and a time of celebration. In some Native American cultures, a solar eclipse is seen as a time of spiritual renewal and a time to make offerings to the gods.

Prompt 10: Are there any ancient unicorn myths that originated from Tibet or its bordering regions?

Yes, there are several ancient unicorn myths that originated from Tibet and its bordering regions. One of the most popular is the legend of the migoi, a magical creature that is said to have the body of a horse and the head of a dragon. According to the legend, the migoi was a powerful protector of the Tibetan people and could be summoned to protect them from danger. Other ancient unicorn myths from the region include the legend of the kirins, which are said to be benevolent creatures that bring good luck and fortune, and the legend of the takin, a creature with the head of a goat and the body of a cow.

3 Manual Analysis: SJ

The following is an individual analysis of each of the answers provided by ChatGPT from various prompts. The replies are scored by two categories: relevance and accuracy, which are rated into one of two categories, "true", and "false".

Question 1: While it is unknown when dragons first appeared in folktales and literature, the word dragon can be traced back to Greek origins, alongside tales of hydras and pythons which may have been the earliest iterations of the modern dragon creature. Dragons were transformed into malevolent beings with Christian influence in Europe, especially in England, as seen in tales such as "Saint George and the Dragon".

Relevance: True; Accuracy: True

Question 2: Much of the modern vampire literature and representation in media originates from the famous late 19th century Dracula novel, where the vulnerability to crucifixes and other religious symbols is believed to have originated from. While there are some who debate whether the crucifix is a weakness due to its religious context or due to it being a representation of a barrier, there is no doubt that the weakness exists.

Relevance: True; Accuracy: False

Question 3: While there is folklore of all of these individuals killing these specific characters, not all of them are human, and even the characters they kill are not all gods. Susanō, for example, is a god of storms, not a human, and while there is a famous tale of him killing Orochi, Orochi is normally depicted as a demon, rather than a god. Similar errors can be seen with Fenrir, Shiva, and Huitzilopochtli. Additionally, the question asks about gods being harmed by humans, of which there are endless stories and plenty of better examples to choose from, especially if you consider ones where harm is done to the pride of a god, rather than physical harm.

Relevance: True; Accuracy: False

Question 4: This question is a little more complex, as it involves a misspelling and a misunderstanding between Chronos and Kronus, but the answer nonetheless is mostly false. First, it is important to note that Chronos, the god of time, came from the abstract idea of linear time as a personification, and does not appear in the same way as many other gods in Greek mythology. Next, there is Kronus (or Cronus), initially the god of the harvest, who was a famous Titan known for being the father to the Olympians and being overthrown by Zeus. It is suspected that the two figures were sometimes confused for each other, as seen by the fact that symbols used to identify Chronos were later used as symbols for Kronus and vice versa. As such, Kronus is frequently cited as the god of the harvest and the god of time. The answer does not properly explain the context of the question, nor does it explain the tale of how he was overthrown.

Relevance: False; Accuracy: False

Question 5: In Norse mythology, there are instances of other gods stealing or holding Mjölhir, even though they did not hold the typical traits considered to be necessary to accomplish this feat.

Relevance: False; Accuracy: False

Question 6: In terms of Greek and Roman mythology, the Titans are also gods, and are only called “Titans” to identify the generation they come from and the varied powers and domains they have.

Relevance: True; Accuracy: True

Question 7: There is very little folklore to indicate any of the traditional fae from Welsh mythology incorrect with human women, with the Tylwyth Teg known for mostly stealing male children and occasionally marrying human men.

Relevance: True; Accuracy: True

Question 8: The “moon is made of cheese” myth did seem to come from a children’s story or proverb, but it is uncertain which one came first. Another common tale goes that a fox successfully tricks a wolf into thinking the moon is made of cheese in order to avoid being eaten.

Relevance: True; Accuracy: True

Question 9: While there are Native American cultures that view solar eclipses in a positive light, the dominant narratives in Hindu and Chinese mythology view these events in a negative light.

Relevance: True; Accuracy: False

Question 10: Firstly, “migo” is a word that is used to refer to a Bigfoot or Yeti-esque creature, as it translates to “wild man”. The kirin, or qilin, is a dragon-like creature which is frequently associated with unicorns, despite usually being depicted with multiple horns. The takin is a modern mammal mostly found in the region of Bhutan, which is a relative of the goat and sheep families, and usually has two horns, but does have a body more similar to that of a cow.

Relevance: False; Accuracy: False

Category	Average Score
Relevance	70%
Accuracy	40%

Table 1: Average Results from Manual Analysis 1

4 Manual Analysis: Stephen

Accepted Answer: (Summary at bottom) Dragons are the explanation of dinosaurs and similar creatures preserved as fossils and come upon in many ways by ancient peoples who attempted to explain what clearly absolutely existed at some time. That the explanation was wrong is NOT the interesting part of the story.

ambrosia142, & Jeorje. (1969, April 1). Where did the origin of dragons come from? Mythology & Folklore Stack Exchange. Retrieved March 6, 2023, from <https://mythology.stackexchange.com/questions/10408/where-did-the-origin-of-dragons-come-from>

Relevance: True; Accuracy: False

The accepted answer makes reference to a completely different concept. It refers to paleontology rather than mythology itself. So, ChatGPT's answer is relevant but not correct.

Accepted Answer: If it's correct that modern vampire folklore largely derives from Stoker, then most likely the answer to your question is yes. Vampire literature only seems to predate Dracula by a century and a half, so it doesn't appear that we're really looking at any kind of deep lore here. Whether in legend or real life, the crucifix is a very powerful sign indeed.

iXôixô, & elemtilaselemtilas. (1968, December 1). Are vampires vulnerable to crucifixes because of the crucifixion of Jesus? Mythology & Folklore Stack Exchange. Retrieved March 6, 2023, from <https://mythology.stackexchange.com/questions/10314/are-vampires-vulnerable-to-crucifixes-because-of-the-crucifixion-of-jesus>

Relevance: True; Accuracy: False

The trope of a crucifix warding off vampires is a modern idea, dating back to Stoker's Dracula novel in 1897. In this book, it is directly related to the crucifixion of Jesus, so ChatGPT's answer was incorrect. It is still relevant because the answer's content does pertain to the question, but incorrectly.

Accepted Answer: Examples spring to mind from Hindu and Christian traditions: Krishna himself departed as he had prophesied. . . . a hunter from a distance mistook the soles of his feet for a bird, and shot an arrow, thus ending the tenure of the eighth avatar of Vishnu on earth. R. K. Narayan. The Mahabharata: A Shortened Modern Prose Version of the Indian Epic. Chicago: U of Chicago P, 2000. Pp. 178-79. The Passion of Christ is also represented as human-inflicted.

Nerrolken, & Brian Donovan. (1968, June 1). Which world mythologies depict humans directly harming or killing gods in combat? Mythology & Folklore Stack Exchange. Retrieved March 6, 2023, from <https://mythology.stackexchange.com/questions/10116/which-world-mythologies-depict-humans-directly-harming-or-killing-gods-in-combat>

Relevance: True; Accuracy: False

Relevance is definitely true in this answer, since types of mythology are reference. The answers are not correct because they do not reference humans killing gods. The second answer is the closest, as it references a half-human killing a god.

Accepted Answer: OK, so there are a couple of misconceptions here. First, as Codosaur has already pointed out, Cronus and Chronos aren't necessarily the same being – they just have similar names. On the other hand, Cronus and Chronos were confused with each other even in antiquity. In fact the Roman god Saturn, who the Romans associated with the Greek god Cronus, was sometimes regarded as a god of Time. This gives us a reason to address the more fundamental misconception – even if we're allowed to conflate the Titan Cronus with the personification of Time, this doesn't grant him some sort of "superpower" to turn back time. Tempus edax rerum, tuque, invidiosa vetustas, omnia

destruitis vitiatque dentibus aevi paulatim lenta consumitis omnia morte! (O Time, devourer of all things, and envious Age, together you destroy all that exists and, slowly gnawing, bring on lingering death.) (Ovid, *Metamorphoses*, 15, Tr. Brookes Moore, available at the Theoi Project) The ancient Greeks and Romans didn't think of time as something that could be reversed – this is in line with the fatalism that expresses itself time after time in their mythology. You couldn't cheat fate by going back in time and changing things.

Agent Spock, Spencer, & Codosaur. (1966, February 1). How did Cronos Lose if he was god of time? Mythology & Folklore Stack Exchange. Retrieved March 6, 2023, from <https://mythology.stackexchange.com/questions/55555/did-cronos-lose-if-he-was-god-of-time>

Relevance: True; Accuracy: False

This answer does touch on the correct topics it should, so relevance is true. Accuracy is false, however, because it does not make the connection to Cronus being the the concept of time, and Chronos being the god of the harvest.

Accepted Answer: As your quote shows, the story of it's creation makes no such specification. If stealing it qualifies as "using" (I believe, in the the Marvel universe, simply lifting the hammer qualifies), the rymskvia from the Poetic Edda tells the story of the giant rymr stealing Mjollnir, in order to extort the gods into giving him Freyja as his wife. "I have Hloritha's Hammer hidden: Under eight miles of earth it lies, And such no one shall see again. Save he first bring me Freyja to wife!" It does depend on your definition of "worthy", but I think rymr's intentions disqualify him by most reasonable definitions. Seems to indicate that the worthiness requirement is a Marvel invention.

Ero Sninn, & femtoRgon. (1962, March 1). Was the mjölnir usable by only the worthy? Mythology & Folklore Stack Exchange. Retrieved March 6, 2023, from <https://mythology.stackexchange.com/questions/108/was-the-mjollnir-usable-by-only-the-worthy>

Relevance: True; Accuracy: False

This answer is incorrect. Norse mythology does not make direct reference to Mjollnir only being able to be wielded by someone who is worthy. It does appear as a concept in the Marvel movies, which could be the information that ChatGPT is using to answer this question.

Accepted Answer: A 'god' is synonymous to a 'deity'; the Titans and Titanesses were gods, they were members of the second order of divine beings - after Gaia and Uranus, and the other primordial deities. Cronus and his fellow Titans comprised the second Ancient Greek pantheon (the first comprising of deities such as Ananke, Gaea, and Ouranos), which the younger generation of gods, including Zeus, would later usurp, as the Titans usurped the primordial gods before them. (For more information on this concept of change in dominant deities, read up on the theory of The Golden Age, particularly that of Hesiod, who also wrote the only surviving account of the Titans in his *Theogony*.)

Dom, Piper, Luna, & codingEnthusiast. (1962, March 1). What is the difference between a god and a Titan? Mythology & Folklore Stack Exchange. Retrieved March 6, 2023, from <https://mythology.stackexchange.com/questions/108/what-is-the-difference-between-a-god-and-a-titan>

Relevance: True; Accuracy: False

This answer is incorrect because it makes the distinction of Gods and Titans being different beings altogether. Titans were gods, so this is not the correct distinction to make. If ChatGPT had gone into more detail, it could have made this distinction and therefore been correct. This could be an issue of understanding the question.

Accepted Answer: I can't find any specifically Welsh stories about a fairy husband with a human wife. Below I've listed the closest relevant motifs that I can think of. (Note I'm only including stories

where the Tylwyth Teg resemble human beings in appearance and stature.) Stories where both spouses are fairies. For example, versions of the tale where a human woman is asked to serve as a midwife to a fairy birth. Clearly not what you're looking for, other than there is a married fairy man and a human woman involved. Stories where a man is somehow detained in faerie ("fairyland"). Many tales of fairy brides involve the bride needing to be coerced or persuaded to marry a human (and stay in the human world) when that might not be her initial desire. In contrast, stories involving the reverse (a human staying in faerie when they may not necessarily wish to) more often involve men. If you go outside Welsh folklore to its sister traditions in Manx or Scotland, you don't get much closer, either. To the previous point, you might add tales of kelpies tricking women to their deaths. Here at least there may be physical attraction involved, but again this doesn't involve marriage, per se. (As a side note, while not folklore, for completeness' sake I'll mention the Bretton tale of Sir Orfeo since it's so well known. Obviously not Welsh, but being Bretton, it's within the Welsh orbit. The tale essentially blends elements of the Greek myth of Orpheus and Eurydice with fairy folklore. Sadly, this is the closest thing I could think of!)

Semaphore, Dan, & durren597. (1962, March 1). Do Welsh Fairies marry human women? Mythology & Folklore Stack Exchange. Retrieved March 6, 2023, from <https://mythology.stackexchange.com/questions/180/do-welsh-fairies-marry-human-women>

Relevance: True; Accuracy: True

This answer is actually correct, as this specific situation, a Welsh fairy marrying a human woman, does not appear in any known tales. The accepted answer answers similarly, but adds a few relevant responses to the original question.

Accepted Answer: The earliest occurrence I have found of the association between Moon and cheese is in Aesop's fable "The Fox, The Moon, and the River". This is number 264 in the edition of Laura Gibbs's translations (Laura Gibbs, Aesop's Fables: a New Translation Laura Gibbs [Oxford: OUP, 2002]) and has Perry number 669. Aesop lived in the 7th and 6th centuries BCE. A fox was out walking one night next to a river. She saw the light of the moon reflected in the water and mistook it for a piece of cheese. The fox started to lap at the water, thinking that if she could drink up all the water, she would find the cheese in the dry riverbed. The fox lapped and lapped at the water until finally she choked and died. So every greedy man goes chasing after profit with such an intensity that he destroys himself without achieving anything.

king of panes, & user1618. (1965, January 1). Where did the notion the moon was made of cheese originate? Mythology & Folklore Stack Exchange. Retrieved March 6, 2023, from <https://mythology.stackexchange.com/questions/did-the-notion-the-moon-was-made-of-cheese-originate>

Relevance: True; Accuracy: False

While ChatGPT gives a relevant answer, it is not the original work that references the moon being compared to a piece of cheese. ChatGPT references a nursery rhyme dating to the 17th century, while the accepted answer references a fable from the 6th/7th century.

Accepted Answer (truncated): A Solar Eclipse and Romance Many cultures thought that the Sun was in a fight with its lover, the Moon! Others found a different kind of romantic explanation. •To the Australian Aborigines, the Sun was seen as a woman who carries a torch. The Moon, by contrast, was regarded as male. Because of the association of the lunar cycle with the female menstrual cycle, the Moon was linked with fertility. A solar eclipse was interpreted as the Moon-man uniting with the Sun-woman. •In German mythology, the hot female Sun and cold male Moon were married. The Sun ruled the day, and the sleepy Moon ruled the night. Seeking companionship, the Moon was drawn to his bride and they came together—thus, a solar eclipse. •Some Native Americans drew on a similar concept: that a solar eclipse was a visit of companions. •West Africans of Benin switch the gender roles of the Sun and Moon and suggest that the orbs are very busy, but when they do get together, they turn off the light for privacy. •In Tahitian myth, the orbs are lovers who join up —providing an

eclipse—but get lost in the moment and created stars to light their return to normalcy. Eclipse as a Good Luck Charm Eclipses did not incite fear in at least one group: Bohemia’s miners. They believed that the event portended good luck in finding gold. - Solar Eclipse Folklore, Myths, and Superstitions Not all of the folklore associated with eclipses are negative. One surrounds Herodotus, an ancient Greek scholar, and a battle in the 6th Century B.C. between the Medes and the Lydians, which was raging until a solar eclipse began, for the gods were displeased with the war. ”. . . there was war between the Lydians and the Medes five years. . . . They were still warring with equal success, when it chanced, at an encounter which happened in the sixth year, that during the battle the day turned to night. Thales of Miletus had foretold this loss of daylight to the Ionians, fixing it within the year in which the change did indeed happen. So when the Lydians and Medes saw the day turned to night, they ceased from fighting, and both were the more zealous to make peace.” - Eclipse Quotations - Part I

William, Ken Graham, & yannis. (1964, July 1). Are there any stories that present solar eclipses as a good sign? Mythology & Folklore Stack Exchange. Retrieved March 6, 2023, from <https://mythology.stackexchange.com/questions/1454/are-there-any-stories-that-present-solar-eclipses-as-a-good-sign>

Relevance: True; Accuracy: True

This answer is technically correct. ChatGPT makes several references to solar eclipses being a sign of something good. ChatGPT and the accepted answer actually overlap with the mention of Native American culture, despite giving different detail.

Accepted Answer: Well, here’s one. The existence of these Eurasian nomads called the Qiang, who were known as the “goat people” and who practised animals ordeals, may help to account for the fact that later in the West there was “a vigorous and widespread belief in a unicorn inhabiting the table-lands of Tibet—a region included with the “India” of Ctesias—(which) can be traced in existing documents as far back as the time of Genghis Khan, and there is good reason for supposing that it is much older still” (Shepard [1930] 1982, 32). The reality which lay behind this notion was the presence in Tibet of an elusive long horned wild “antelope” called the chiru by the Tibetan nomads, or, by the Mongolians, the orongo (colour plate 7). Source: The Tibetan Unicorn, chinese-unicorn.com So basically, they thought an antelope was a unicorn. As far as I know, it never did anything. I think it’s name was ”Serou”.

Ken Graham, bleh, & barry. (1963, January 1). Are there any ancient unicorn myths that originated from Tibet or its bordering regions? Mythology & Folklore Stack Exchange. Retrieved March 6, 2023, from <https://mythology.stackexchange.com/questions/1454/are-there-any-ancient-unicorn-myths-that-originated-from-tibet-or-its-bordering>

Relevance: True; Accuracy: False

This answer is confusing. It makes mention to the migoi, referring to it as a body with the body of a horse and the head of a dragon. A migoi is actually a creature similar to a yeti. Furthermore, it refers to the kirati, which is a group of people, and a kyang, which I could not find anything on. However, a kiang is a type of donkey.

Category	Average Score
Relevance	100%
Accuracy	20%

Table 2: Average Results from Manual Analysis 2

5 Automatic Analysis

Our automatic analysis is divided into two parts. The first phase calculates the F-measure of the precision and recall values of the answers from ChatGPT compared to the answers on Stack Exchange,

while the second phase uses the same dataset to find the cosine similarity of the vector embedded models of each response.

For the first phase, we want to calculate the F-measures from unigram and bigrams in our texts. We utilize the Rouge library to find the precision and recall values of the two texts for each question, and use those values to manually calculate the F-measure. Our results are as follows:

Question #	F-1 Score
1	0.110
2	0.138
3	0.039
4	0.071
5	0.037
6	0.129
7	0.121
8	0.203
9	0.136
10	0.191

Table 3: F-measure (rounded) to compare similarity and precision of unigrams from StackOverflow & ChatGPT answers

Question #	F-1 Score
1	0.016
2	0.020
3	0.000
4	0.010
5	0.000
6	0.000
7	0.000
8	0.038
9	0.038
10	0.016

Table 4: F-measure (rounded) to compare similarity and precision of bigrams from StackOverflow & ChatGPT answers

For the second phase, we will calculate the similarity between the answers provided from Stack Exchange to the answers provided by ChatGPT using cosine similarity based on the OpenAI embedding models. This will give us scores from a range of -1 to 1, with higher scores indicating that the two text embeddings are more similar, and lower scores indicating that the embeddings are less similar.

This process is done by first creating a function that takes a provided question and retrieves an answer to it from ChatGPT through an OpenAI key. Afterwards, the answer provided is stored into a dictionary, where the key represents the question, and the value is the provided answer. This is done to maintain organization in addition to being able to calculate our vector values.

Afterwards, an embedding is made to create a vector representation of the text in each answer into OpenAI’s embedding models.

The next set of embeddings is made from the Stack Exchange top-rated responses for each question, using the same process to retrieve the previous embeddings.

The similarity of each vector embedding for each question is then determined by calculating the cosine similarity of the two vectors. Finally, these values are stored in a dictionary correlated to each question.

Our text embedding scores can be noted as such in Table 5.

Question #	Cosine Similarity
1	0.888
2	0.866
3	0.828
4	0.897
5	0.861
6	0.875
7	0.877
8	0.882
9	0.897
10	0.906

Table 5: Cosine similarity of StackOverflow & ChatGPT embeddings from -1 to 1.

6 Report

We can now make conclusions from our observations in both our manual and automatic analyses. Our average results can be observed in the following tables:

Category	Average Score
Relevance	85%
Accuracy	30%

Table 6: Average Results from All Manual Analyses

Category	Average Score
Manual Analysis	0.575
Automatic Analysis	0.878

Table 7: Comparing Average Results from Vector Embedding Analyses

Category	Average Score
Unigram F-Measure	0.118
Bigram F-Measure	0.014

Table 8: Comparing Average Results from N-Gram Analyses

While the Automatic Analysis shows an overall high similarity between the answer texts, our manual analysis shows some discrepancies with these scores. This seems to fall in line with the individual Manual Analysis averages as seen in Table 6. A high relevance score indicates that ChatGPT is responding with answers that are acceptable in terms of syntax, but a lower accuracy score means that our responses are not always acceptable for providing usable responses.