

1 LOST IN TRANSLATION: TRANSLATING GENERATION
2 ALPHA INTERNET SLANG USING MACHINE LEARNING

3 A Special Problem Proposal
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Abstract

19 Internet slang is an informal variation of language that is prominent to the younger
20 generation. The usage of this language brought generational divide between them
21 and the older generations. This study aims to develop a translation tool leveraging
22 Large Language Models (LLMs) to bridge this issue. A dataset of Generation
23 Alpha slang sentences and their formal equivalents will be used to fine-tune an
24 existing LLM. The model will be trained to translate slang sentences into formal
25 English, and will be compared against the baseline model using various evaluation
26 metrics. The study highlights the significance of addressing communication gaps
27 and provides insights into how technology can enhance understanding and reduce
28 miscommunications across generations. This research contributes to the broader
29 discourse on language adaptation and generational communication in the digital
30 age.

31 **Keywords:** Internet Slang, Generation Alpha, Miscommunication,
LoRA, LLM

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Chapter 1

Introduction

1.1 Overview

Language is how humans communicate and express themselves (Crystal & Robins, 2024). It is dynamic because there are endless structural possibilities, changes in word meanings, and new words created (Libretexts, 2021). Slang is a great example of the dynamic nature of language. Slang is an informal language used by people in the same social group (Fernández-Toro, 2016). It serves social purposes: to identify a group's members, communicate informally, and oppose established authority (McArthur, 2003). Slang is highly contextual and pervasive, even in non-standard English. (Roth-Gordon, 2020) Its figurative nature and how it twists the definitions of the words used in it make it hard for outsiders to understand (Mattiello, 2005).

In recent years, the internet has become a significant medium for the evolution and spread of language, giving rise to 'internet slang' (J. Liu, Zhang, & Li, 2023). Internet slang is a collection of everyday language forms used by diverse groups online (Barseghyan, 2014). Ujang et al. (2018, as cited in (binti Sabri, bin Hamdan, Nadarajan, & Shing, 2020)) state that Internet slang is not easily understood by people outside the social group or people who are not fluent in the language where slang is used. This phenomenon is particularly prominent among the younger generation (Maulidiya, Wijaya, Mauren, Adha, & Pandin, 2021), where they use it to communicate and interact with friends.

Today, Generation Alpha is the youngest generation. Generation Alpha refers to people born between 2010 and 2025. They were born into an era of rapid technological advancement, where digital devices and the internet are integral to

93 their daily lives (McCrindle & Fell, 2020). Generation Alpha is also called the
94 first true digital natives (Jukić & Škojo, 2021). They are expected to be the most
95 “technologically” skilled and most educated generation as they are the native
96 speakers of the language of the Internet (Prensky, 2001). According to the study
97 *Understanding Generation Alpha*, Generation Alpha is socially driven, which may
98 let them grow up to be creative and unconventional, potentially shaping them to
99 be assets in the future (Jha, 2020).

100 Since Generation Alpha was born with technology, the usage of Internet slang
101 has been prominent in this generation. However, it can create communication
102 barriers between older and younger generations (Venter, 2017 as cited in (Ghazali
103 & Abdullah, 2021)). The communication barriers caused by the usage of Inter-
104 net slang also affect people from the younger generation, especially individuals
105 who are less active on social media and have less exposure to them (Vacalares,
106 Salas, Babac, Cagalawan, & Calimpong, 2023). This gap highlights the need for
107 a tool that can bridge the generational divide, making it easier for individuals
108 to understand the language of Generation Alpha. By fostering a mutual under-
109 standing, such tool can promote more effective and harmonious interactions across
110 generations, enhancing relationships and reducing miscommunication.

111 1.2 Problem Statement

112 Internet slang fosters informal, relatable communication within the younger gen-
113 eration (Ghazali & Abdullah, 2021), especially Generation Alpha, but it presents
114 challenges in understanding for people outside this demographic. The gap in com-
115 prehension with older generations widens as internet slang evolves, often leading
116 to miscommunication affecting social relationships that contribute to the genera-
117 tional divide (Vacalares et al., 2023). A more specific translation tool developed
118 using language models can be used to bridge this divide.

119 By leveraging the ability of LLM to generate a more nuanced and properly
120 constructed answer, a better tool can be made to translate the slangs into proper
121 sentences. It has already been proven by the likes of GPT being modified and tai-
122 lored for use in several automated chatbots to provide customer service. However,
123 no such tool exists for slang translation of Generation Alpha, which arguably has
124 the most diverse slangs compared to other generations. The creation of this tool
125 will allow translating of such texts into formal sentences and help with bridging
126 the generational divide between them and older people, especially teachers.

1.3 Research Objectives

1.3.1 General Objectives

This study aims to modify an existing Large Language Model (LLM) for use in the translation of Generation Alpha internet slang used by Filipino children in social media.

1.3.2 Specific Objectives

- To create a dataset of sentences containing Gen Alpha slang and its formal translation
- To create a Low Rank Adaptation (LoRA) implementation for fine-tuning an existing model
- To fine-tune an existing LLM to translate sentences containing Gen Alpha slang into formal sentences
- To evaluate the performance of the trained model and compare it to the based model using several performance metrics

1.4 Scope and Limitations of the Research

This study will focus on the usage of internet slang by Filipino Generation Alpha, with an emphasis on English language since it is widely use on different digital platforms such as social media.

1.5 Significance of the Research

The study contributes to understanding the evolving linguistic landscape shaped by internet slang, especially as used by Generation Alpha. Insights gained from this study may aid educators, parents, and communication professionals in bridging inter-generational communication gaps and fostering better understanding across age groups.

Chapter 2

Review of Related Literature

2.1 Communication Gap between Generations

Language is dynamic in nature thus, constantly evolving over time. One example of this behavior is the development of internet slang. Internet slang is a result of language variation and is often regarded as informal (S. Liu, Gui, Zuo, & Dai, 2019). In the study, *The Use of Online Slang for Independent Learning in English Vocabulary* (Ambarsaru, Amrullah, & Nawawi, 2020), students used internet slang to express their feelings and emotions, and to align their communication style with their peers.

However, this development has its challenges. It is suggested that younger generation should use slang to communicate with each instead of older generations because it might cause confusion between them (Jeresano & Carretero, 2022).

This miscommunication is prominent between generations with differences in linguistic familiarity as Suslak (Suslak, 2009) argues that age influences language use, noting that language evolves across generations. Supporting this, a study by Teng and Joo (teng & Joo, 2023) found that the older a person is, the less likely they are to understand internet language.

The studies showed that using internet slang improves relationship between those who use it. However, using internet slang for inter-generational communication can be a hindrance to proper and effective communication (Gonzaga, Racal, & Estrada, n.d.).

2.2 Existing Studies

Khazeni et al. (Heydari, Albadvi, & Khazeni, 2024) used deep learning to create a model for translating Persian slang text into formal ones. The researchers explored the challenges of translating Persian slang into English within the context of film subtitling, specifically focusing on the performance of three neural machine translation (NMT) systems, namely Google Translate, Targoman, and Farazin. The primary interest of the paper lies in the understanding how these NMTs systems handle the complexities of slang translation. It was revealed that the NMT systems often struggle to capture the nuances of slang, leading to unnatural and inaccurate translations. Targoman performed best in naturalness, it fell short of human translation quality. This implied the need for specialized algorithms or training data suitable for slang, and potentially human post-editing, to achieve accurate and culturally appropriate translations in this domain.

The study by Nocon et al. (Nocon, Kho, & Arroyo, 2018) explores translating Filipino colloquialisms, such as Conyo and Datkilab, into standardized Filipino, addressing comprehension barriers for non-familiar speakers. Two machine translation (MT) approaches were evaluated: Tensorflow’s Sequence-to-Sequence model using Recurrent Neural Networks (RNNs) and Moses’ Phrase-based Statistical MT. Moses outperformed Tensorflow on test data due to its handling of phrase combinations and unfamiliar words, while Tensorflow excelled on training data, indicating potential with refinement and more training data. The research underscores the need for robust datasets and highlights the strengths of phrase-based statistical MT in tackling slang translation challenges.

Ibrahim and Mustafa (Abdulstar Ibrahim & Shareef Mustafa, 2023) developed a system to translate slang into formal language, addressing challenges posed by slang’s informality and variability. Using updated datasets of slang words, formal equivalents, and contextual sentences, they fine-tuned pre-trained models from Hugging Face’s Transformer library. While the T5-base model showed promise during training, it performed poorly in testing. In contrast, the “facebook/bart-base” model excelled, demonstrating high accuracy and low loss values. The study highlights the importance of fine-tuning and updated datasets for effective slang translation and emphasizes the potential of transformer models like “facebook/bart-base” in bridging informal and formal language gaps.

2.3 LoRA for Fine Tuning

Low Rank Adaptation, or LoRA, is an efficient Parameter Efficient Fine Tuning (PEFT) method proposed by Hu et al (Hu et al., 2021). It can significantly decrease the required storage for training while producing comparable results and in some cases, even outperforming other adaptation methods. In addition, it has minimal chance of catastrophic forgetting as the original weights are not being tampered with, unlike other finetuning methods. These factors make it a suitable option for slang translation as a quick yet accurate solution. In a study conducted by Zhao et al. (Zhao et al., 2024), they determined that some LLMs using LoRA for fine tuning can outperform GPT-4, one of the most advanced LLM models currently. A study by Nguyen et al. (Nguyen, Wilson, & Dalins, 2023) used LoRA in fine tuning a pre-trained Llama 2 7B model for text classification of a dataset that contains slang. They were able to create a more accurate model compared to models by existing studies at that time.

2.4 Chapter Summary

This chapter shows how generational differences create communication gaps, especially due to internet slang. Younger people tend to use slang to express emotions and connect with friends, but this can confuse older generations who aren't as familiar with these terms. Research shows that as language changes over time, older people are generally less likely to understand the newest internet language. To bridge this gap, some recent studies have utilized machine learning to translate slang into more standard language. For instance, Khazeni et al. (Heydari et al., 2024) used deep learning to translate Persian slang, while Nocon et al. (Nocon et al., 2018) created a Filipino slang translator using statistical models. Moreover, Ibrahim and Mustafa (Abdulstar Ibrahim & Shareef Mustafa, 2023) fine-tuned pre-trained models to learn slang meanings. One of the promising techniques for this is Low Rank Adaptation (LoRA), which is a fine-tuning method that keeps the original model stable while using less storage. Studies by Zhao et al. (Zhao et al., 2024) and Nguyen et al. (Nguyen et al., 2023) show that LoRA models are not only efficient but can even outperform advanced models like GPT-4 when it comes to slang translation and text classification.

Chapter 3

Research Methodology

This chapter lists and discusses the specific steps and activities that will be performed to accomplish the project. The discussion covers the activities from pre-proposal to Final SP Writing.

3.1 Research Activities

3.1.1 Creation of the dataset

A dataset of sentences containing Generation Alpha slangs and its formal translation or an approximation of will be created. This will involve data scraping, use of existing datasets, or any other suitable methods of obtaining data. This dataset will be used for the training and evaluation of the model. To ensure it is a high quality dataset, it will be manually checked for accuracy and grammatically correctness. It will also be checked for any potential biases that may exist in the dataset or the data collection process.

A complete dataset of sentences containing Generation Alpha slangs is expected at the end of this task.

3.1.2 Identification of potential LLM to be used

We will be reading upon existing LLM comparison studies to identify potential LLMs to be used for this study. We will be primarily using studies that used

dataset containing slangs as they are the most similar to our required dataset. A good potential model is zephyr-7b-beta due to its popularity, more open license, and number of parameters. Having 7B parameters allows the training of models on a 16GB GPU with a 4-bit quantization.

A model to use should be determined at the end of this task.

3.1.3 Lookup on available GPU on demand services

Available computing power rental services will be looked up for this study. As LLM training are a resource-intensive process, it is important to ensure that the necessary computing power is available. However, this computing power requires expensive equipment that might not see usage after the project is completed. Thus, it has been decided that it is better to rent the computing power for the duration of the project. A report on available GPU on demand services will be created using market research and price to computing power ratio.

3.1.4 Study on LoRA implementation for LLM

A thorough study on the implementation of LoRA for fine-tuning will be done. This includes learning the necessary steps, logic behind the idea, and other necessary information necessary for implementation. For this step, reading upon guide materials regarding fine-tuning and LoRA as well as existing studies will be done. We will be primarily using the guide provided by HuggingFace as it is one of the largest repositories for prebuilt LLMs. In addition, they also provided guides for fine-tuning models for specific purposes and has model specific guides.

3.1.5 Preprocessing of data

The dataset used for the fine-tuning of the model will be cleaned up. This will require removal of non essential information such as email addresses, URLs, etc. This is to ensure that the model can focus on learning the patterns between the slang and its formal translation without being affected by noise.

A clean dataset ready for tokenization is expected at the end of this task.

283 **3.1.6 Prototype implementation of LoRA**

284 A prototype implementation of LoRA will be created using a less demanding
285 model. This is to avoid incurring costs from constantly retraining the model due
286 to bugs in the code. It will be also developed on the same language as the final
287 implementation to avoid any issues with the code translation. As it is a prototype,
288 it will be used to create a foundation for the complete implementation of LoRA.
289 It will ensure that during the final implementation, there will be no issues with
290 the code and the model can be fairly evaluated.

291 For this task, Google Colab will be used as a platform of choice due to the free
292 cloud computing resource and the use of Jupyter notebook. In addition, Python
293 will be used as the language of choice to the abundance of available libraries for
294 training LLMs.

295 **3.1.7 Implementation of LoRA on selected model**

296 A full implementation of LoRA will be done using the previously created prototype
297 as a basis. This step will mostly involve tweaking the parameters used to train
298 the selected model and fixing any hidden bugs in the generated results.

299 **3.1.8 Implementation on LLM Evaluation Metrics**

300 A set of evaluation metrics will be used to determine if the fine-tuned model will
301 perform better than the base model. These metrics will be taken from existing
302 studies on LoRA finetuning and slang translation. It will serve as the primary
303 measure in which LLMs are compared with from each other. For this purpose,
304 Recall-Oriented Understudy for Gisting Evaluation (ROUGE) will be used to
305 score the generated output compared to ground truth. The use of LLM as a judge
306 might also be considered to directly compare the results of the fine-tuned and the
307 base model.

308 **3.1.9 Model Evaluation and Analysis of Results**

309 The model obtained from previous steps will be evaluated using the evaluation
310 metrics determined from the previous step. To do this, the testing set split of
311 the dataset will be used as the basis of evaluation. In addition, descriptive infor-

312 mation such as loss function per epoch and perplexity will be determined. This
 313 information will be used as supplement to evaluation metrics to determine if the
 314 fine-tuned model performed better than the base model.

315 3.1.10 Documentation

316 All members are tasked to provide accurate and detailed logs of their activities.
 317 This includes steps on the task they are working on, the status of the work being
 318 done, and the time spent on the task. It will serve both as documentation and as
 319 a progress tracker to determine how far the project is from being done. It will be
 320 done every week at the member's leisure.

321 3.2 Calendar of Activities

322 Table 3.1 shows a Gantt chart of the activities. Each bullet represents approxi-
 323 mately one week worth of activity.

Table 3.1: Timetable of Activities

Activities (2024-2025)	Dec	Jan	Feb	Mar	Apr	May	Jun
Creation of the dataset	•						
Identification of potential LLM to be used	•						
Lookup on available GPU on demand services	•						
Study on LoRA implementation for LLM	•						
Preprocessing of data	•••						
Prototype implementation of LoRA	•	••••					
Implementation of LoRA on selected model			••				
Implementation on LLM Evaluation Metrics			••				
Model Evaluation and Analysis of Results				••••			
Documentation	••	••••	••••	••••	••••		

324 Chapter 4

325 Preliminary Results/System 326 Prototype

327 A prototype LoRA implementation was created on Google Colab. This uses
328 zephyr-7b-beta model as the base model for finetuning and a part of the ultrachat
329 dataset as the training dataset. The zephyr-7b-beta model was chosen as it is one
330 of the best performing model after LoRA finetuning (Zhao et al., 2024).

331 This snippet is based on the fine-tuning guides available on HuggingFace and
332 the PEFT guides on several websites. This prototype only uses 100 iterations to
333 train the model based on the ultrachat dataset. Most of the parameters used in
334 this prototype is the same with the examples but it establishes a proof of concept
335 on the usage of Google Colab as a potential training platform and the ability of
336 LoRA to improve generative results.

Figure 4.1: Code snippet of the prototype

```
from transformers import TrainingArguments

YOUR_HF_USERNAME = "chichiboo"

output_dir = f"{YOUR_HF_USERNAME}/zephyr-7b-qlora-ultrachat"
per_device_train_batch_size = 4
gradient_accumulation_steps = 4
optim = "paged_adamw_32bit"
save_steps = 10
logging_steps = 10
learning_rate = 2e-4
max_grad_norm = 0.3
max_steps = 100
warmup_ratio = 0.03
lr_scheduler_type = "constant"

training_arguments = TrainingArguments(
    output_dir=output_dir,
    per_device_train_batch_size=per_device_train_batch_size,
    gradient_accumulation_steps=gradient_accumulation_steps,
    optim=optim,
    save_steps=save_steps,
    logging_steps=logging_steps,
    learning_rate=learning_rate,
    max_grad_norm=max_grad_norm,
    max_steps=max_steps,
    warmup_ratio=warmup_ratio,
    lr_scheduler_type=lr_scheduler_type,
```

Table 4.1: Difference between Generated Answers of the Base and LoRA Fine-Tuned Model

Before LoRA:

USER:	Can you explain contrastive learning in machine learning in simple terms for someone new to the field of ML?
ASSISTANT:	Contrastive learning is a machine learning technique that involves training a model to learn from data that is similar to the target data. The model is trained to identify patterns in the data that are similar to the target data, and to use those patterns to make predictions about new data.

After LoRA:

USER:	Can you explain contrastive learning in machine learning in simple terms for someone new to the field of ML?
ASSISTANT:	Contrastive learning is a technique in machine learning that uses a technique called contrastive loss to train a model. The idea is to train a model to distinguish between similar and dissimilar data. In contrastive learning, a model is trained to distinguish between a pair of similar data, such as a pair of images, and a pair of dissimilar data, such as a pair of different images. The model is trained to minimize the loss, which is the difference between the similarity and dissimilarity of the data. In contrast, traditional machine learning techniques, such as supervised learning, are trained to distinguish between different types of data, such as a classification or regression task. In summary, contrastive learning is a technique in machine learning that uses a technique called contrastive loss to train a model to distinguish between similar and dissimilar data, which is different from traditional machine learning techniques, such as supervised learning.

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⁴³⁰ **Appendix A**

⁴³¹ **Appendix Title**