



Senior Design Project

NEUTLAN

Project Specification Document

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1 Introduction

In today's contemporary world, gender equality is one of the outstanding topics. It is an international concept which many international organizations or even countries are trying to raise awareness about the topic. Therefore, there are several actions taken to this issue however there are many aspects of it such as economic, language, and daily life. For example, to close the gender pay gap the globe needs one hundred and thirty-two years [1]. To achieve gender equality in language, we need a Gender-Fair language (GFL). One principle can be obtained to have a gender fair language: neutralization. Neutralization is changing the words with masculine forms to gender unmarked forms [2]. For example, today in the formal language and contents, he or him is used to represent a person. By replacing this with they or them is turning the words in an unmarked gender form or instead of using policeman (a masculine form word) police officer can be used to neutralize the word and job in terms of gender. Another significant concept of today's world in terms of gender equality is gender biased artificial intelligence (AI). Today, we see many examples of gender biased AI in many technological applications. A classic example is the Google Translate. For example, Turkish is gender neutral language in terms of pronouns so if "This person is president, and this person is cooking" written in Translate, it puts "He's president and she's cooking" [3]. It transforms the sentence in a biased way.

From these two significant approaches, we decided to contribute to make an improvement. Our project's name is NEUTLAN which comes from the slogan neutralize the language. In our project, the aim is to neutralize the content of any written text in terms of language by implementing the neutralization principle. In this way, we will act against gender biased ai by forming an unbiased one. Our target group for this project is mainly content creators nevertheless; everyone can use it to write more unbiased content.

In this document, a brief description of NEUTLAN will be given. Afterwards, constraints of the project in aspect of many fields such as social context will be provided. The professional and ethical issues of the project will be given, and the functional and non-functional requirements of the project will be explained.

1.1 Description

In this project NEUTLAN, we plan to develop a browser extension and a web application which will help users to neutralize their language. It will check the written content and suggest GFL interpretation of gender-biased words or phrases. NEUTLAN will be a product performance innovation because, as far as we know, there are no similar applications, and it holds substantial and sustainable value [4]. To implement this system, we plan to use Natural Language Processing (NLP) technique to capture the gender-biased content in the user input and provide suggestions [5]. We aim to make our application useful by developing both an extension and a web application. Customers will be able to use NEUTLAN while sending e-mails, using translators, or creating social media content by using the extension. In addition, by using the web application, users will be able to check their writings and save them for future use.

As we mentioned in the introduction part gender equality is one of the popular topics of our age; however, in terms of technological development, there are no sufficient works that amend gender equality and prescript people to behave accordingly. Therefore, NEUTLAN will be a sustained innovation that focus on filling that gap and create new value. In addition, considering the growing sentiment about gender equality, NEUTLAN is likely to create a new customer group [6].

Gender discrimination is a sensitive topic that does not accept any apologies. Even though people are more careful about their language compared to last decade, still many sexist contents flow on the internet. Sometimes people unintentionally make mistakes. They use the wrong pronunciation or say something offensive without noticing. Hence, for not to make any mistakes many people check their language over and over again. One of our aims is to transform this long and distressing process of self-checking the email, post, or any kind of written content into an easy automated process. The proposed system will remove the burden of making a mistake that may offend others and prescript people to use gender-neutral language.

1.2 Constraints

1.2.1 Implementation Constraints

- GitHub platform and Git will be used to sustain the consistency and create development environment for all members. Progress will be monitored through commits [7].
- GitHub Issues will be used to assign tasks for each member and monitor the progresses.
- GitHub Actions will be used for automation of CI pipeline for the server. The deployment will be done for the NLP model training.
- Twitter gender biased datasets and Kaggle Sexist Workplace Statements datasets will be used for training. Other datasets found and proved to be useful can be used [8].
- Google cloud servers will be utilized for NLP model trainings.
- Chrome will be used for testing environment of extension.
- Firebase product of Google will be used for deployment of web application.
- To store the new data coming from users will be stored in external database.

1.2.2 Economic Constraints

- Kaggle do not charge the usage of datasets. However, if useful database will be found that requires charge, it can be bought.
- Google provides \$ 300 cloud usage for new commers for first 3 months [9]. Hence, for first 3 month, it is not expected to be paid for the servers. Later, with optimized usage, servers can be used with charges.
- Deployment of extension will not require fee.
- Deployment of web application on Firebase might require some fee after 3-month trial period.
- The application will be free for the first version.

1.2.3 Language Constraints

- First version of this application will support English language for both in-app and detection of phrases.

1.2.4 Ethical Constraints

- The data collected by the users, who admitted sending, anonymously will not be shared to third parties.
- The data will not be stored in the form where they can be linked with its source.
- The development team will abide to the code of Ethics by National Society of Professional Engineers [10].
- The data which may be a debated content whether it is sexist or not, several experts may be consulted for determination.

1.2.5 Social Constraints

- Application will not provide any interaction between users.
- The recommendation system provided by NLP model will be autonomous and not provided by people.
- The processing of texts and recommendations will not be visible by other users.

1.3 Professional and Ethical Issues

When we consider professional and ethical issues, there are several issues that we should consider in our project. Since we are going to review users' words, sentences, or articles, we first need to get permission from them about it. In addition, since we will receive, process, and use data such as users' writings, we will never share this data with 3rd party companies or other places after we receive this data. We will store and use the data of the users in a private way to establish user security and privacy. In addition, while storing the credentials we will get from the user for the login system in the database system, we will store the hashes of the users' passwords to increase privacy. Instead of launching the application directly while using the application, we will ask users to start the application, and we will get their permission.

2 Requirements

2.1 Functional Requirements

2.1.1 Web Application

- The user can sign into application to use, or he/she can use application without sign in.
- The user can log out from application.
- The user can type some text content or upload a document to use application.
- The user can delete her/his account from the system
- The user can look at the previous content he/she uploaded or typed to analyze before.
- The users can see the content's grade in terms of the corrects and mistakes on their texts or uploaded files.

2.1.2 Extension

- The user can activate the extension to use the application by clicking validate button on the processing page content.
- If the user wants to use NEUTLAN, he/she should use Mozilla or Chrome browser to use extension.
- The user can deactivate the extension by removing it.

2.1.3 Web Application and Extension

- The application will underline the mistakes which are sexist contents, meanings or words and give recommendations to change them in a proper way.
- According to the recommendation, the user can choose to change the content but if the user does not click the recommendation the app won't change the text of that sentence or word.
- According to the result of the application, if there is no sexist phrase or meaning in the user's text or the uploaded file and nothing to change, the user will be informed in this regard.

- Before first use of the application, users must confirm a confirmation text for data security.

2.2 Non-functional Requirements

2.2.1 User-friendliness

- The user interface should be simple and effective in a way that can be easily understood and used by the user. The user interface should not be too complicated because NEUTLAN aims to appeal to literate users of all ages.

2.2.2 Reliability

- The project to be done should correctly distinguish sexist patterns, meanings, and words in sentences or texts, and suggest proper corrections. The sexist structures detected should have a high proper accuracy rate.
- NEUTLAN's servers should not be down frequently or for long periods of time because NEUTLAN will become part of users' daily lives.
- When an error occurs on the program or the operation that the user wants to perform on the program cannot be realized, the user should be informed adequately.

2.2.3 Performance

- The runtime of the application to be made should give feedback to the user as quickly as possible (~20-30s).

2.2.4 Extensibility

- The application should be able to be extensible in terms of adding or developing new features according to the feedback from the innovation experts and supervisors.
- Extension will be developed primarily for NEUTLAN and then the web application will be developed.

2.2.5 Scalability

- NEUTLAN will be introduced in the school first, but after the developments are completed, it is aimed to reach a wide audience and be used by a wide audience. Therefore, NEUTLAN should be scalable in a way that can reach many users.

3 Future Plans & Discussions

- The investigation of the applicability in Turkish language will be done if there is enough time and if it is found to be applicable, then Turkish language will be provided as second language supported by the application in the following versions.

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