

# Practical Task 4

Babu Pallam  
P2849288

## EXERCISE 1: Formulation of Research Problem

### Step IV:

The subareas of the research area chosen for study - 'Machine Learning', are 1. Architecture of ML- Assisted Models for Ease of Life and 2. Natural Language Processing. The research questions that hopefully to be answered at the end of the research of each subarea are provided below.

#### 1. Architecture of ML- Assisted Models for Ease of Life

- a) What are the strategies for ML based models for real-time decision-making in smart society?  
(applications of smart home, smart society, or anywhere human interaction involve)
- b) What hybrid architectures can be designed to combine traditional algorithms with ML for enhanced ease of life applications?
- c) How can ML-based models be adapted to different user preferences and contexts in personalized ease of life applications?
- d) What are the ethical considerations in implementing ML-based models for everyday life assistance and how can the ethical considerations of ML-based models be addressed in model architecture?
- e) How can ML-models be made more robust in dynamic environments such as smart cities or public spaces?
- f) How can ML-based models be made more energy-efficient and sustainable in ease of life applications?
- g) How can ML-based model be made which enhance privacy and security in ease of life applications?

#### 2. Natural Language Processing

- a) How can NLP models be trained to better understand and generate dialogue in human-robot interactions?
- b) How can NLP models be improved to better understand sarcasm and irony in text?
- c) How can NLP methods be adapted to effectively process code-mixed languages?
- d) How can NLP be used to detect and correct bias in social media content?
- e) How can NLP techniques be used to identify and prevent misinformation and fake news online?
- f) What are the best practices for developing multilingual NLP models that perform well across multiple languages? (*Advanced*)
- g) What are the most effective techniques for handling words from local slang of a language in NLP? (*Advanced*)
- h) What are the ethical considerations and potential risks associated with using NLP in decision-making processes? (*General*)

- i) What could be the future of NLP models? (*General*)

## Step V:

After the analysis of each subarea and formulation of the questions, “Natural Language Processing” has been taken into the primary sub area of research. Based on the research questions, the main objective of the study and subobjectives are constructed.

### Main objective (the focus of your study):

The main objective of doing research in “Natural Language Processing (NLP)” is to design and implement models or services which help machines to understand human language with accuracy and precision, including machine translation (text to speech), speech recognition (speech to text), chatbots, and AI-assistants thereby, achieving the final goal – “**Efficient Human-Machine Interaction**”.

### Subobjectives (specific aspects of your study):

The subobjectives for the main objective stated are provided below in terms of **action-oriented words**.

1. To understand Natural Language Processing and Human centric models.
2. To understand Natural Language Generation which gives efficiency to the machine responses.
3. To design personalize Interactions which makes the machines engage according to the situations arrived.
4. To implement systems with multimodal Functionalities which includes voice, text, video, and motion.

## Step VI:

Based on the objective designed, a feasibility study has been performed in terms of cost, time, and knowledge. Based on requirements of skill, time, cost, and other parameters, from the first step, which is the literature review, to the final step, which is ensuring a refined final report, the stages involved and how each stage must be handled have been answered which is given below as a table.

Task	What is involved	Time needed	Approx. Cost	Technical Expertise Needed	Gaps in Knowledge and Skills
Literature Review	Understand the current phase of NLP models for AI-assistants	4 weeks	0	Internet Access to Research Papers and Patent based Papers	Knowledge about NLP, NLP models.
Instrument Construction	Setting up the environment in the machine for data	3 weeks	£100	Efficient machines for computation	Not Applicable

	analysis.				
Data Collection	Collecting authentic data	4 weeks	£100	Use of different frameworks	Not Applicable
Data Analysis	Normalizing data according to the requirements.  Finding the correlation between the data and objective of the problem.	2 weeks	Not Applicable	Use of different frameworks	Effective use of frameworks and programming languages
Draft Report	Literature Review and Formulation of Own Work	3 Weeks	0	Latex/ Microsoft Word	Latex
Final Report	Refining Draft Report	1 Week	0	Latex/ Microsoft Word	Latex

## Step VII:

Are you really interested in the study?	YES
Do you agree with the objectives of the study?	YES
Are you certain you want to pursue the study?	YES
Do you have adequate resources?	YES
Do you have access to an appropriate study population?	YES

It is evident that the study conduct here has relevance in theory and practice.

Relevance to theory:

- Understanding the state of art knowledge of the development happened in human-machine interaction.
- Enhancing the design and implementation of novel approaches
- Advancing Artificial Intelligence and Machine Learning

Relevance to practice:

- Improving the user experience in real world implementation
- Supporting new technologies
- Helping in the field of Academic
- Inspiration to technological development