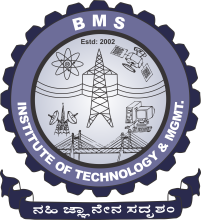
BMS INSTITUTE OF TECHNOLOGY, BENGALURU-560064

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**Student Project Review and Assessment Committee**

**Synopsis**

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| --- | --- | --- | --- | --- |
| **Batch No: CSE-B2** | | **Guide Name:**  **Dr. Thippeswamy G** | | **Submission Date:**  **26/09/2018** |
| **Neural Developmental Intelligent System** | | | | |
| **Sl No** | **USN** | | **Name** | |
| **1** | **1BY15CS006** | | **Adarsh Kumar Sah** | |
| **2** | **1BY15CS016** | | **Bhargav Sagiraju** | |
| **3** | **1BY15CS020** | | **Chandrashekar S** | |
| **Project Execution Place** | | | **In-house: BMSIT** | |
| **Project Category** | | | **Research, Application Project** | |

**Signature of Guide Signature of HOD**

**Abstract:**

The intelligent system is a computer-based system and a computerized AI that tries and succeeds in representing, reasoning about the various events, and interpreting the data. In doing so it learns about the structure of the data, analyses the data to extract patterns and meaning, derive new information, and identify strategies and behaviors to act on the results of its analysis.

The proposed system come in single forms, aims to be working using integrated modules in the Offline Mode and have many applications, from controlling the situation-based answering considering facts, detecting the various emotions in text and possibly speech to processing huge data sets. The ideas and concepts are drawn from the areas of artificial intelligence, machine learning, reinforcement learning where system performs a task and then it’s graded on the result and neural networks which are automated, form interdisciplinary relationships.

In order to develop deep learning inference application at the edge, we use Intel’s both energy efficient and low cost Movidius USB stick. Movidius Neural Compute Stick can run without any need of Internet. The system enables rapid prototyping, validation, and deployment of deep neural networks.Profiling, tuning, and compiling a DNN on a development computer with the tools are provided in the Intel Movidius Neural Compute SDK.

**Introduction:**

When any system claims to be powered by “artificial intelligence” or NLP or neural network it feels like we are in the future. All these buzzwords that are trending these days sure come handy to people with maximum efficiency output when these terms are combined to collectively form the system called intelligent system. This system describes ways for computers to do more advanced tasks and learn from their environment. Human like behaviour is achieved through Reinforced Learning which allows the system to make calculated decisions.

### Some of the key buzzwords:

### ****Artificial Intelligence:** Just means anything that’s Smart and** just like a neural network is a form of machine learning, machine learning is a subset of artificial intelligence. It allows the machine to think like a human being.

### ****Machine Learning:** Teaches Computers to Improve with Practice and** encompasses anything where you teach a machine to improve at a task on its own. More specifically, it refers to any system where a machine’s performance at completing a task gets better solely through more experience performing that task.

### Neural Networks: Analyze Complex Data By Simulating the Human Brain. The term refers to a specific type of learning model that emulates the way synapses work in your brain. Traditional computing in this system uses a series of logic statements to perform a task and use a network of nodes (which act like neurons) and edges (which act like synapses) to process data. Inputs are then run through the system and a series of outputs are generated. That output is then compared to known real-time data.

### Sentiment Analysis: the process of computationally identifying and categorizing opinions expressed in a piece of text, especially in order to determine whether the writer's attitude towards a particular topic, product, etc. is positive, negative, or neutral. It also  refers to the use of [natural language processing](https://en.wikipedia.org/wiki/Natural_language_processing), [text analysis](https://en.wikipedia.org/wiki/Text_analytics), [computational linguistics](https://en.wikipedia.org/wiki/Computational_linguistics), and [biometrics](https://en.wikipedia.org/wiki/Biometrics) to systematically identify, extract, quantify, and study affective states and subjective information.

**Motivation:**

Many of the so-called smart systems are using incorporate functions of sensing, actuation, and control in order to describe and analyse a situation, and make decisions based on the available data in a predictive or adaptive manner, thereby performing smart actions. In most cases the “smartness” of the system can be attributed to autonomous operation based on closed loop control, energy efficiency, and networking capabilities, that is using data from real-time by deriving data at a faster rate. These are the smart systems evolved from microsystems.

The need to process enormous quantities of data has never been greater. Not only are terabyte and petabyte-scale datasets rapidly becoming commonplace, but there is consensus that great value lies buried in them, waiting to be unlocked by the right computational tools.

Therefore, making the smart system available to an individual where one can avoid carrying bulk of data but making use of the smartness available to maintain or overcome hazardous situation lets the motivation of developing the intelligent system using advanced learning algorithms.

**Existing System:**

Several systems which are capable of making intuitive decisions are available which make decisions based on APIs or modules connected to the internet. These systems however require a constant internet connection with limited capability offline and do not allow learning in the offline mode. These systems also have a general overall use case related to families with limited personalization which have constraints on learning behaviour and patterns. The conditions are also rigid and do not provide a flexibility in learning, this is attributed to several home or environment conditions which have a strong influence.

**Limitations of** **Existing System:**

* The existing system must be connected to the internet and has limited activity offline.
* Most intelligent agents available today do not contain emotion based decisive or chat systems which enable offline chat for personalization.
* Personalization is limited.

**Proposed System:**

Introduction of science and engineering of intelligent systems, including correspondence with natural cognitive systems and the design of smart tools. The purpose of this system covers the foundational theories, methods, and supervised, semi-supervised algorithms and technologies involved in artificial intelligence go along with the real-world data and their processing and interpretation.

Incorporating about the theoretical and technical challenges involved in modelling and building systems that can reason, solve problems, acquire and use knowledge, make decisions, and communicate in natural language and Introduction of the science and engineering of intelligent systems, including the correspondence with natural cognitive systems and the design of smart tools acts as the primary purpose of this system.

**System Requirement Specifications**

**Functional**

* Ability to identify the emotion in a given piece of text and respond appropriately.
* Suggest decisions to user based on learning patterns from the user.
* Continuously learn from the users and give suggestions based on learned patterns from the user environment.
* Improving efficiency using supervised and semi supervised learning.
* Ensuring maximum communication between components and system modules used with least delays.

**Non-Functional**

* The system must have fast execution cycles for all the main processes which mainly include several instructions.
* The system should be able to provide useful intuition for any given piece of text.
* Absolute recommendations for every situation with expected running efficiency of 80% through proposed algorithm.
* Detection of stressful situations, make analysis and respond accordingly.
* The system shall ensure the unauthorised usage and protects from being misused.

**Proposed Methodology:**

To address the issues in existing systems a system to deliver the human level intelligence required for an intelligence system, a separate pathway consisting of emotion detection in speech and using reinforcement learning facilitates decision making in the process. The system must have an autonomous level of thinking that allows it to make decisions based on several parameters. This allows the user to have individualized attention to the system. The system must have its own backdrops to learn from the users.

The system must allow for several uncertain situations to be assessed in a certain manner of diligence, this facilitates for human like behaviour. The system will use datasets in compliance with Plutchik’s wheel of emotions which allows mapping of sentences in speech with several emotions listed, this also allows for further training of the model. Reinforced learning will allow the machine to make several decisions which are autonomous and change with user preferences. These decisions will help the user to make careful choices depending on the machine suggested notifications and the user’s own intuition. These suggestions are based on patterns learned over time and help in lifelong learning.

**Objectives:**

**Phase one:**

* understanding the domain: sentiment analysis with emotion detection from text data and reinforced learning which allows decision making.
* Extract subjectivity and sentiment polarity from text data.
* literature survey
* referring the modules based on implementation methods (spaCy/TensorFlow)
* implementation of the above

**Phase two:**

* Raspberry pi 3 and subsystems featuring LED display which execute instructions per cycle time.
* Running high level datasets from Intel Movidius Neural Compute Stick - a unique device designed to facilitate development, tuning and deployment of deep neural networks where the nodes require computation to be performed on-device where power consumption, latency and privacy are crucial factors in product performance. Featuring Myriad VPU, the Neural Compute Stick is able to perform the complex, highly parallel mathematical operations required for modern deep neural networks at high speed (vision processing unit).
* Testing the hardware system with maximum test cases with numerous datasets.

**Phase three:**

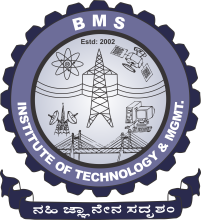
* Integrating phase one and phase two for making the first-ever unique prototype which facilitates the neural computing through integrated Pi and neural compute stick.
* Testing for errors and improving accuracy accordingly.

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BMS INSTITUTE OF TECHNOLOGY & MANAGEMENT

Yelahanka, Bengaluru – 560 064

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Department of CSE

Synopsis for the Project work

“Neural Developmental Intelligent System”

Submitted By:

1. Chandrashekar S 1BY15CS020

2. Bhargav Sagiraju 1BY15CS016

3. Adarsh Kumar Sah 1BY15CS006

Under the Guidance of

Dr. Thippeswamy G

2018-2019