Report
of
Research Internship
on

Natural Language Processing with Deep Learning using python

Organized by
Department of Computer Science and Application
Atal Bihari Vajpayee University, Bilaspur
Under Vritika Scheme of
Science and Engineering Research Board, DST

Department of Computer Science and Application, Atal Bihari Vajpayee University, Bilaspur, Chhattisgarh, organized a Research Internship (RI) titled "Internship on Natural Language Processing with Deep Learning using Python" from July 1 to July 31, 2022, under the Vritika scheme of Science and Engineering Board, Department of Science and Technology(DST). The program was mentored by Dr. Rashmi Gupta and involved the participation of five interns.

During this internship, the primary objective was to address the challenges faced by individuals with visual impairments, particularly in a world where information is predominantly conveyed through text, whether in electronic or print form. The interns took on the task of developing a device designed to assist people with visual impairments. This device aimed to convert text from images into speech, making printed material accessible to those with visual disabilities.

The core framework of this innovative device was built around an embedded system using a Raspberry Pi and a Raspberry Pi camera. The process involved capturing an image, identifying the region of interest containing the text, and subsequently converting that text into speech. To achieve this, a series of image preprocessing steps were employed to extract the text-containing portion of the image while removing the background. Optical Character Recognition (OCR) software and Text-to-Speech (TTS) engines were utilized to facilitate the conversion of the text into speech. The audio output was then channeled through the Raspberry Pi's audio jack, allowing the user to listen through earphones. The result was the creation of Smart Glasses Reader, a tool designed to empower visually impaired individuals by enabling them to read printed text in the English language. This invention sought to motivate blind individuals to engage with newspapers and books, despite their visual challenges. The glasses' primary function was to scan text images and convert them into audio text, which users could then listen to via headphones connected to the glasses. The technology underpinning this solution included OCR, pytsx3, OpenCV, and Optical Character Recognition technology (OCR) with Tesseract. To convert the recognized text into speech, pytsx3 was employed. The user initiated the image capture process by pressing a button, and all computation and processing tasks were executed using the Raspberry Pi4. The use of OCR yielded remarkably high accuracy, with the glasses demonstrating the ability to recognize nearly 99% of the text. However, it's worth noting that the glasses had certain limitations, such as currently supporting only the English language. As part of future plans, there is potential to extend language support and enhance the design for greater comfort and wearability. Overall, the Smart Glasses Reader represented a significant step forward in improving accessibility and facilitating the communication of visually impaired individuals.

Details of Interns:

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Photographs