

Detect the class of book Using ISBN With Artificial Intelligence / Convolutional Neural Network (CNN)

Assist. Prof. Muna Hazim Yahya¹, **Assist. Prof. Dr. Sarah Saadoon Jasim**²,
Assist. Prof. Dr. Mohammed Sammany³

^{1,2} Department of IT, Technical College of Management-Baghdad, Middle Technical University, Baghdad, Iraq, E-mail (mhy@mtu.edu.iq)¹ and (sara-sm@mtu.edu.iq)²

³ Pharmacy Practice Department, Faculty of Pharmacy, Heliopolis University for Sustainable Development, 3 Cairo Belbes Desert Road, P.O. Box 2834, Cairo, Egypt, E-mail (sammanyddr1@hotmail.com)

ABSTRACT:

This study aims to employ artificial intelligence techniques to libraries and information centers and book classification to determine its efficacy and the need for intelligent technology to make book classification easier. Where a CNN network was used to classify the book by (ISBN), the data set included the first five branches of the base classification number (for the Dewey Decimal Classification). Based on these results, we achieved that the model has an accuracy of 77.7% and 80.3% for validation. The research recommends training the library staff to use artificial intelligence technology to ensure the quality of classified books.

Index Terms— Artificial Intelligent (AI); Deep learning; Convolution neural network (CNN); ISBN.

I. Introduction

The first industrial revolution attempted to supplant human labor with mechanical means. Quality differences will differ from what we currently anticipate, but the impact of AI and advanced computer technology on the future of libraries will be substantial. Since most AI programs established to date or in development are library-oriented, they mainly serve as essential runtime business tools (Corrado, 2021). Systems that facilitate the many facets of running a library, such as personnel, finances, collection growth, scheduling, etc., are a viable possibility. Tools for improving user services, such as quick referencing and databases, fall under this category (Vijayakumar & Sheshadri, 2019) (Harischandra et al., 2016) (Jasim & Hassan, 2022).

The remainder of the paper is organized as follows: First, a Historical overview of ISBN is presented in Section 2. Then, related work describes in section 3. Next, the proposed system is presented in Section 4. Then, section 5 shows the experiment's Results and Discussion. Final Section 6 presented the essay's conclusion and works for the future.

II. Historical overview of the International Standard Book Numbers (ISBN)

Publishing, distribution and bookselling entered the world of computer and automation systems internationally in the mid-sixties, so the standard number (SBN) was adopted in Britain in 1967. Later developed internationally into the international standard Book Number (ISBN); there was included in the ISO 2018 in 1970. It is now used in over 175 countries as a standard book identification number. There are agents

now in most Arab countries, the most recent of which is Iraq (Bradley, 1992; Hakala & Walravens, 2001).

A. Features of the international standard Book Number (ISBN)

- 1- Automated transactions means that computers communicate with each other.
- 2- Computer devices need clear and understandable data.
- 3- The standard number does not accept typos and saves time.
- 4- Facilitate sales management electronically (archiving, accounting, requests).
- 5- It facilitates searching for a book, especially on the Internet, where millions of books exist (Achalare et al., 2014).

B. The components of (ISBN)

- (ISBN) Knows the product and does not know the content ISBN.
- It consists of 13 digits
- It consists of 5 sections

The first and last sections are fixed in length and do not change. Figure (1) shows the parts of the international number (Achalare et al., 2014; Ahmad, 2003).

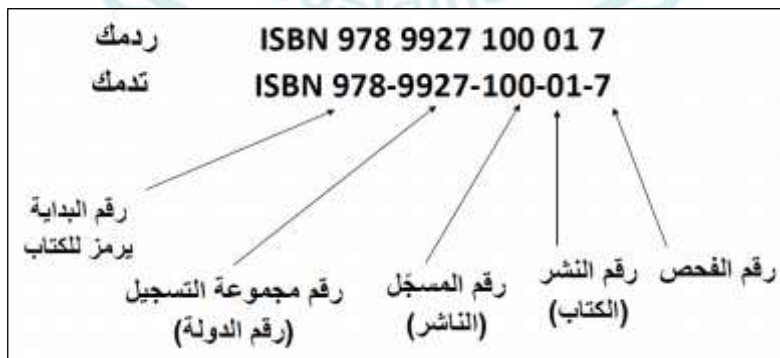


Fig (1): The parts of ISBN (Bradley, 1992; Hakala & Walravens, 2001)

C. What are the uses of the ISBN

There are several uses for ISBN (Ahmad, 2003; Bradley, 1992)

- 1- For the implementation and follow-up of orders.
- 2- For archiving and building a database of printed books.
- 3- It is the primary key to the title of the book for the publisher or seller, or distributor.
- 4- Accounting programs.
- 5- To facilitate the search for and circulation of books.
- 6- To obtain accurate statistics in the publishing world.

III. Related Work

Recent developments in artificial intelligence, machine learning, or deep learning have made enormous strides in image recognition (Yu et al., 2021). However, in recent years, few studies have been shown in libraries with AI.

This work (Asemi & Asemi, 2018) used Exploratory Factor Analysis (EFA) to identify LIS's most practical AI approaches. ESs mimic librarian experts to aid decision-making and management. Speech recognition, machine translation, and librarian robots use AI. This study examined four criteria for applying AI to Iranian library systems in public, technical, and management services. Taxonomy was used to assess service progress, where Iranian library systems have the highest developed Recommender Systems (RM) and the least developed NLP.

The study) Lei & Liu, 2019(aims to research and analysis in the development of artificial intelligence using bibliometric measurements as an effective tool for evaluating research trends in various fields. Web of Science academic database, and in this study, the annual research rates of intellectual production were analyzed. Its distribution according to publishing countries, publishing institutions producing this intellectual production specialized in developing artificial intelligence. The most productive authors, the distribution of the most important research topics, and research related to artificial intelligence based on bibliometric measurements, this study provides a valuable reference for researchers to understand the development of artificial intelligence from multiple perspectives.

A study (Guo et al., 2020) is keen on the intellectual production registered in artificial intelligence related to health care to provide an analysis and description of this intellectual production through the bibliometric method. The Web of Science database has been relied upon for all the intellectual production registered about the field. The study was cited and published in English until December 2019. Based on bibliometric indicators, a research strategy was developed to examine intellectual production. The study showed that the increase in intellectual production reached 17.02% annually since 1995, but the growth rate of intellectual production increased significantly to 45.15% from 2019 to 2014.

This article aims (Siddique et al., 2023) to investigate the intellectual production published in Library and Information Science (LIS) in the Arab world from 1951 to

2021. The research encompassed 22 nations associated with the League of Arab States. Additionally, it identifies the countries with the highest output, organizations with significant contributions, prolific authors, reputable journals, prevalent forms of cooperation, and the most frequently occurring main topics. The bibliometric method was employed in the Arab region to assess intellectual output via the Scopus database. In addition, a thorough search strategy was implemented to obtain 863 articles. Furthermore, the data was analyzed and described using professional tools such as VOS Viewer, Biblioshiny, BiblioAnalytics, Microsoft Access, and Microsoft Excel. One of the study's notable findings is an increasing trend in the number of publications being produced. Many studies have been published in recent years, particularly between 2018 and 2021. Notably, 2020 saw the highest number of publications. According to the Scopus database, Kuwait and Saudi Arabia were the top two countries regarding research output. Among the most productive organizations were Kuwait University, King Fahd University of Petroleum and Minerals, and Imam Abdul Rahman bin Faisal University.

VI. The Proposed System

In this section, we present to detect the book class using (ISBN) using artificial intelligence with (CNN) algorithm. This research used the Keras TensorFlow library and some libraries, of which

- NumPy:- package for scientific computing with Python we will use for arrays and lists.

- CSV:- To read the dataset saved in a CSV format.
- matplotlib:- To draw diagrams and display images.
- TensorFlow:- The library contains Keras, or (CNN).
- glob:- to open all dataset files from the folder.

A. Dataset

Five categories of books were taken, and they are all files of type (.CSV), as follows:

First: brilliant_narrative, which contains (2086) record.

Second: horror_story, which contains (1217) records.

Third: humorous_narration, which contains (795) records.

Fourth: science_fiction_novel, which contains (1737) records.

Fifth: travel_novel, which contains (1710) records.

B. A convolutional neural network (CNN)

A convolutional neural network is an artificial neural network that can evaluate image inputs using multiple perceptrons, each with independently trainable weights and bases to segment the image into distinct regions. Convolutional neural networks benefit from exploiting local spatial coherence in the input images so that more parameters can be shared, and hence fewer weights are needed. In terms of both memory and complexity, it is evident that this technique is effective (Tammina, 2019). Designers describe a convolutional neural network (CNN) architecture with its roots in (Wang et al., 2019)

work on phrase classification and numerous iterations since then. Figure (2) describes the steps for processing the dataset used in the research.

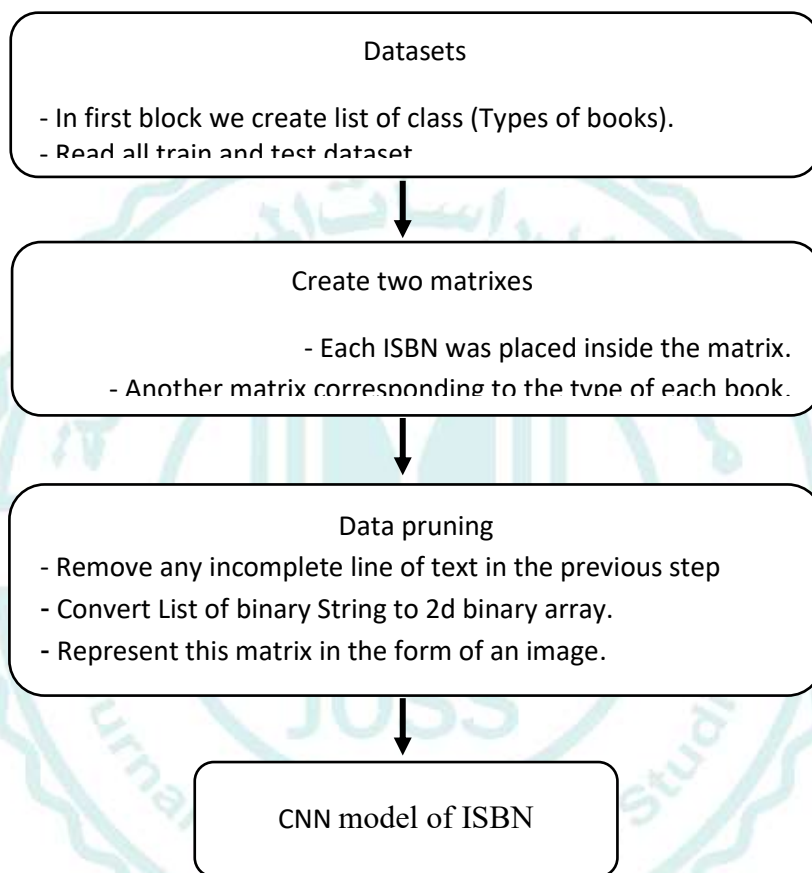


Fig (2): Steps processing of ISBN dataset of CNN model

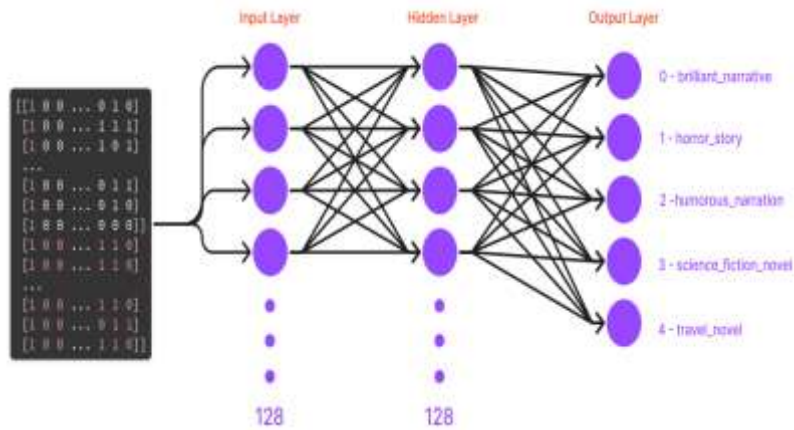


Fig (3): The CNN architecture of ISBN datasets

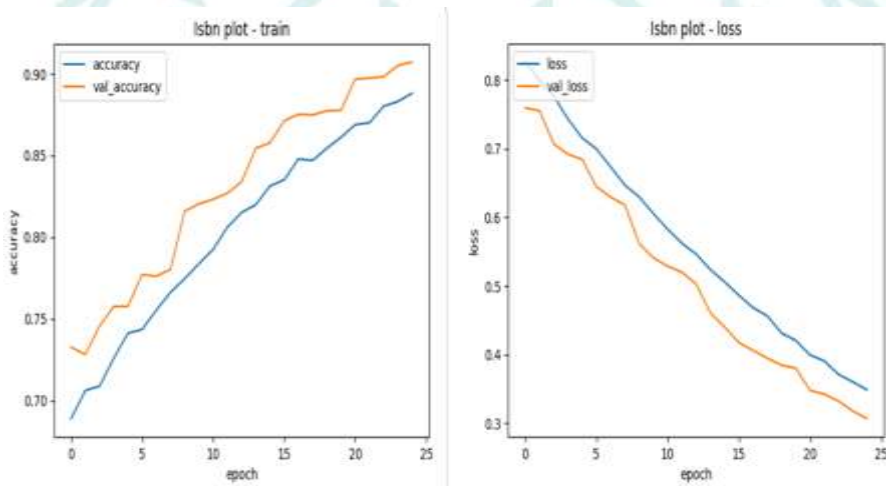


Fig (4): The proposed model's accuracy and loss

V. Results and Discussion

The experimental results of the suggested classification method will be discussed in this subsection. 70% of the ISBN dataset is used for training and 30% for testing. Figure (4) shows training accuracy between 50% and 90%, indicating that the CNN method can learn the presented data. Based on these results, we understand that the model has

an accuracy of 77.7% and 80.3% for validation after (25) epochs. And therefore, the classification of book classes was aided by the CNN model's ability to learn features from processed input data.

VI. CONCLUSION

The most important conclusions reached by the study: firstly, through the use of the network (CNN), good results, the accuracy of 77.7% and 80.3% for validation have been reached. Secondly, it facilitates the process of classifying books by librarians with the least effort and the fastest possible time. Finally, a lack of research and studies dealing with artificial intelligence in classifying books using the International Standard Number (ISBN). In contrast, an important recommendation in the study is increasing the sample size of ISBN used in the classification to obtain better results. Orientation of librarians towards interest in the subject of classification through (ISBN) using artificial intelligence techniques. Increasing interest in integrating artificial intelligence technologies to work in the library environment and benefiting from them to ensure the quality of classified books and keep abreast of the latest modern developments in this field.

REFERENCES

- Achalare, R., Patil, S., & Patil, S. (2014). Significance of ISSN and ISBN in Publications. *Journal of Current Pharma Research*, 5(1), 1378.
- Ahmad, A. (2003). Secrets of Error Detection Scheme of ISBN System. *Caledonian Tech-News—A Journal: Caledonian Journal of Engineering (CJE)*, 1(1), 10–14.

- Asemi, A., & Asemi, A. (2018). Artificial Intelligence (AI) application in Library Systems in Iran: A taxonomy study. *Library Philosophy and Practice*, 2.
- Bradley, P. (1992). Book numbering: the importance of the ISBN. *Indexer*, 18(1), 25-26.
- Corrado, E. M. (2021). Artificial intelligence: The possibilities for metadata creation. *Technical Services Quarterly*, 38(4), 395-405.
- Guo, Y., Hao, Z., Zhao, S., Gong, J., & Yang, F. (2020). Artificial intelligence in health care: bibliometric analysis. *Journal of Medical Internet Research*, 22(7), e18228.
- Hakala, J., & Walravens, H. (2001). *Using International Standard Book Numbers as Uniform Resource Names (2070-1721)*.
- Harischandra, P., Shylesh, S., & Aithal, P. (2016). Information technology innovations in library management: a case of SIMS. *International Journal of Current Research and Modern Education (IJCRME)*, 1(1), 657-676.
- Jasim, S. S., & Hassan, A. K. A. (2022). Modern drowsiness detection techniques: A review. *International Journal of Electrical and Computer Engineering*, 12(3), 2986.
- Lei, Y., & Liu, Z. (2019). The development of artificial intelligence: a bibliometric analysis, 2007-2016. *Journal of Physics: Conference Series*,
- Siddique, N., Ur Rehman, S., Ahmad, S., Abbas, A., & Khan, M. A. (2023). Library and information science research in the Arab World: a bibliometric analysis 1951-2021. *Global Knowledge, Memory and Communication*, 72(1/2), 138-159.
- Tamina, S. (2019). Transfer learning using vgg-16 with deep convolutional neural network for classifying images. *International Journal of Scientific and Research Publications (IJSRP)*, 9(10), 143-150.
- Vijayakumar, S., & Sheshadri, K. (2019). Applications of artificial intelligence in academic libraries. *International Journal of Computer Sciences and Engineering*, 7(1), 136-140.
- Wang, R., Li, Z., Cao, J., Chen, T., & Wang, L. (2019). Convolutional recurrent neural networks for text classification. 2019 International Joint Conference on Neural Networks (IJCNN),
- Yu, X., Wang, S.-H., & Zhang, Y.-D. (2021). CGNet: A graph-knowledge embedded convolutional neural network for detection of pneumonia. *Information Processing & Management*, 58(1), 102411.