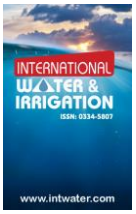

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Analysis of Intelligent Recommendation System for Literature Education Using Deep Learning

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Abstract: Teaching literature is essential for fostering critical thinking, creativity, empathy, and cultural understanding among pupils. However, traditional methods face challenges, including incomplete instruction, limited access to diverse resources, and insufficient engagement, particularly in poetry education. To address these issues, this study proposes an Advanced Sand Cat Swarm-driven Consecutive Convolutional Neural Network (ASCS-CCNN) approach that enhances poetry fluency and literature strategies. The model integrates a recommendation system using collaborative filtering to optimize the sequencing of educational resources. Data preprocessing involves tokenization and feature extraction using Term Frequency-Inverse Document Frequency (TF-IDF). The proposed ASCS-CCNN method evaluates students' performance in poetry instruction based on metrics like similarity, tone correctness, and rhyme accuracy. The findings reveal that incorporating well-chosen texts aligned with curriculum objectives significantly improves student engagement and appreciation of poetry. The ASCS-CCNN model demonstrates superior performance, achieving enhancements in consistency (4.88%), fluency (5.02%), meaningfulness (4.94%), and poutiness (4.82%). This innovative approach offers a promising solution to improve literature education for primary and secondary students.

Keywords: Recommendation System, Literature Education, Curriculum Enhancement, Advanced Sand Cat Swarm Driven Consecutive Convolutional Neural Network (ASCS-CCNN).

1. Introduction

In primary and secondary school, literature education in the study of poetry is essential because it develops students' linguistic skills. Student's critical and creative thinking skills are developed through experiencing a variety of literary styles, genres, and subjects. It also promotes a deeper understanding of cultural diversity. This introduction emphasizes the importance of integrating poetry into educational programs to improve students' learning experiences and personal development [1]. Providing new ideas and tools to enhance teaching and education has changed the way people learn in recent years. It provided many opportunities for improving student achievement by adapting instructional materials to meet the needs of individual students [2]. Cultural understanding for student intellectual and personal development was greatly encouraged by facilitating literature instruction. Because students have different reading stages and learning levels, teachers are challenged to meet the unique needs of each student while using many common strategies in literature instruction [3]. System Multilevel Strategies, Intelligent Suggestion Systems, Student Reading Choice, Academic Performance, Demographics, Reading - Uses history to determine skill levels of individual interest and areas for improvement. Personalized student profiles are created based on the data [4]. The textual features of literary works that use complex approaches like content-driven filtering and shared filtering are intended to develop a connection between students' preferences and other text characteristics. Finally, the system continually adjusts to the changing requirements of students by enhancing based on poetry viewer feedback through iterative learning procedures [5-6]. By exposing students to diverse array of literary genres, authors and cultural views, turn cultivates for world literature. Instructors may use data-driven analytics to effectively alter their class plans, identify areas of learning that need improvement, and evaluate student progress [7]. Technology provides cooperative learning

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environments where students can communicate, share recommendations, and investigate literary ideas, as shown in Figure 1.

Figure 1: Poetry enthusiast of student literary education

Students' perception of the learning environment changes how much student learning and effectiveness of the instructional environment occur. If a teacher's teaching approach is compatible with the students' learning approach, it creates a harmonious environment [8]. The platform for presenting customized resources to students and supporting their online learning is the learning asset recommendation system. It facilitates online learning, the collection of assessment materials, and the participation in group interactions. It offered more specialization learning resources based on the real requirements of students on resources content [9-10]. Literary works make it daunting for educators to curate personalized reading lists that resonate with each student's interests, preferences, and proficiency levels. There are many obstacles facing literature education, including inaccurate education, lack of varied ideas, inadequate investment, and restricted access to materials. The objective of this study is to improve literature education of primary and secondary schools by creating an intelligent recommendation system that makes use of deep learning networks. This method is to provide individualized reading materials that encourage deeper engagement and comprehension of literature by analyzing students' interests in learning poetry work, comprehension levels, and curricular needs.

2. Related work

The system that can create poetry from an input image that satisfies rhythmical and rhyming requirements was implemented and evaluated. A convolutional neural network (CNN) [11] for image object categorization powers the poem generating system. A long short-term memory (LSTM) trained on song lyrics was assembled for this purpose as a module for identifying rhymes and related terms. The researchers who believed that the evaluation of inspirational value in cultural ecosystem services using Chinese poetry from West Lake ecological was primary assortment and an encouraging values indicator system [12]. A vital tool for preserving cultural legacy and an integral aspect of sustainable development, this study delves at the ways AI can be used to further poetry teaching in the current era. It is a watershed moment in the history of cultural preservation. We automated the classification of contemporary Chinese poetry using an XGBoost-MCP model that we obtained after data preprocessing using Doc2Vec and XGBoost. An example of how computer technology is being used to enhance poetry education is the creation of the XGBoost-MCP model. This model provides a more precise and time-saving method for automatically categorizing modern Chinese poetry [13]. The pedagogical effects of incorporating creativity into fifth-grade students' poetry writing and reading were examined in an article [14]. The focus of a diffractive study was on new materialism to determine how individual formative agents affect students' processes of meaning-making. The demonstration of dance integration's instructional worth was to improve and raise the meaning-creation process while writing and reading poetry, as well as the instruction of literature.

3. Methodology

The purpose of ASCS-CCNNtechnique is used to improve the literature education in primary and secondary schools by creating an intelligent recommendation system, the poem data is gathered and then data pre-processing

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is employed using tokenization. The TF-IDF is used to extract the feature from pre-processed data. Figure 2 shows the overview of methodology.

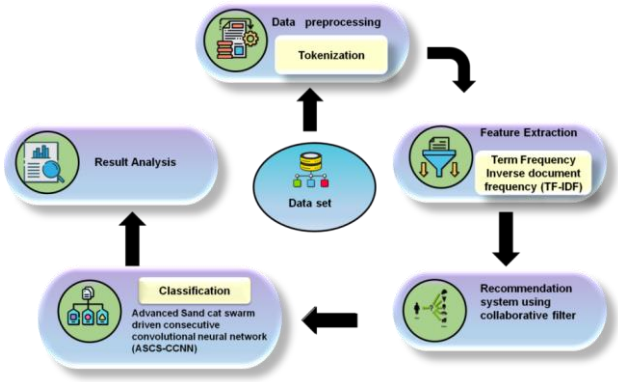

Figure 2: Work Flow of Methodology

3.1 Dataset

The dataset comprises 8729 poems, which were cleaned manually. 6449 poems are currently accessible, as information many poems was lost over time. The dataset includes details such as the poet in literature education. China's elementary and secondary education systems are essential to the schools function as centers of cultural interaction, encouraging an understanding of China's diversity.

3.2 Data preprocessing using tokenization

Efficient data preparation is essential for creating a recommendation system in literary education for primary and secondary schools. Tokenization, which divides textual content into smaller units, such as words, to facilitate an informed examination, was the first important step. Patterns, attitudes, and themes in texts are simpler to identify using this approach. A recommendation system that incorporates tokenization might effectively evaluate and suggest books according to their relevance and suitable educational level, improving students' educational experiences. Tokenization may be used to convert text into a set of meaningful components. Tokens are names for these elements; to divide a text piece into individual words or phrases, based on the assignment of task in Table 1, the classification criterion for text into meaningful tokens.

Table 1: Working principle of Tokenization

Poem: *"One roads diverge with a blue woods,* *To seen the sky in the moon..."*
Tokens: *Sentences: ["One roads diverge with a blue woods,", " To seen the sky in the moon ..."]* *Words: [["One", "roads", "diverge", "in", "a", "blue", "woods,"], ["To", "Seen", "the", "sky", "in", "the", "moon", "..."]]*

3.3 Feature extraction using TF-IDF

The TF-IDF method uses word statistics to extract text features and assist in discovering significant characteristics linked to identity management in literature education, procedures by detecting key phrases that are often occurring inside certain texts and relatively rare throughout the full collection by computing $TF - IDF$information many poems was lost over time. The initial stage in this feature extraction process is to calculate the poem lines in data sector$TF - IDF$. The most significant characteristic throughout the entire information collection is demonstrated

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by the $TF - IDF$ words. A feature's frequency of recurrence in a dataset divided by all the characteristics in a timestamps was text file is called its threshold literature education in primary and secondary schools $TF - IDF$ formula, as followed by equation (1).

$$SE_{j,i} = \frac{m_{j,i}}{\sum_l m_{j,i}} \quad (1)$$

$SE_{j,i}$, denotes the significance of term i in document$j$. It is a metric used to determine h relevant a specific term is within a particular word in poem lines, $m_{j,i}$ represents the frequency of term in poem lines$j$, in equation (2) JCE_j might be used similarly to IDF in weighting terms in information retrieval and text mining tasks.

$$JCE_j = log \frac{|C|}{1+|i:s_j \in c_i|} \quad (2)$$

$$SE - JCE = SE.JCE \quad (3)$$

In equation (3), according to their frequency and distribution across texts and words with the TF-IDF might indicate a personalized technique for term weighting.

3.4 Collaborative filter models in recommended system

Collaborative filtering is a popular technique of poetry read recommendations, which employs viewer interactions to poetry writers and then recommends items that is relevant to individuals across poem attributes. Recommendation systems employ collaborative filtering that might recognize people based on liked lines in poetry, which have similar likes, and forecasts to make recommendations for poetry lines by trends in viewer preferences. Through providing customized recommendations, this approach improves poetry viewers experience and fosters more in-depth interaction with poetry material. Significant developments might be identified with the use of deep learning networks in preschool and secondary literary education. Such approaches improve the student engagement with interactive material that efficiently customize learning experiences, to provide intelligent suggestions based on the likes and demands of each individual student. By encouraging students' more thorough comprehension and interest for reading, the integration of such technology has the potential to enhance literary instruction and support their overall academic development. Figure 3 demonstrates the collaborative filtering.

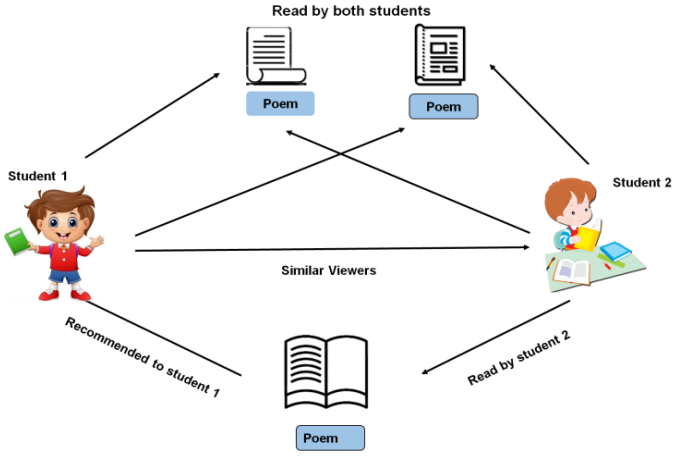

Figure 3: Collaborative Filter

3.5 Advanced Sand cat swarm driven consecutive convolutional neural network (ASCS-CCNN)

The ASCS-CCNN is a hybrid model that optimizes rhythmic and structural strategies to improve the fluency of poetry lines. While sand cat swarms are recognized for their effective and organized poem lines, ASCS-CCNN techniques present an improved interpretation of poetry lines that is more combined and fluid.

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- **Advanced Sand cat swarm (ASCS)**

The meta-heuristic technique known as advancedsand cat swarm was motivated by the way sand cats operate in groups of students writing poem. It offers an innovative viewpoint in student intelligence investigation by modeling the natural behaviors observed within sand cat colony with the objective to solve optimization challenges while writing poems.

Initialize stage of poem lines

In the dimension optimization issue, every sand cat is an $1 \times dim$ array in equation (4). Student stages of writing poems are (stage1, stage2, stage 3) within the lower and higher boundaries. The initialization procedure generates an initialization matrix based on the dimension; iterations might provide the best lines, if the subsequent output value is better, the present solution could be changed. As shown in Figure 4, symbolizes the problem's solution.

$$q_h = T_N - \left(\frac{T_N \times s}{S}\right) \quad (4)$$

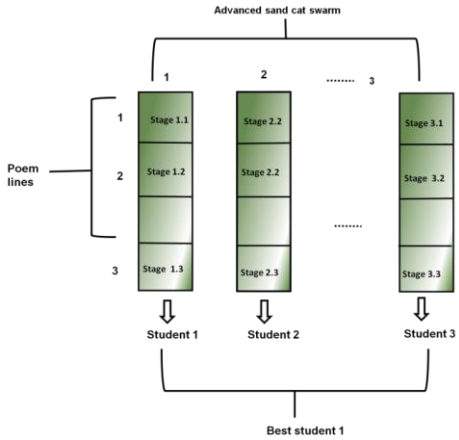

Figure 4: Initialization Of Poem Texts

Exploration phase

Stage 2 is the expression for each poem line's capacity to hear, is an advantage of the ASCS algorithm when it comes to low-frequency detection. The frequencies are lower than 4 kHz. The sensitivity range of the letter frequency is 2 to 0 kHz according to equations (5) and (6), which defines the sensitivity q_H in mathematical modeling, the exploration and exploitation ability of the algorithm is regulated.

$$S = 2 \times q_H \times rand(0,1) - q_H \quad (5)$$

$$q = q_H \times rand(0,1) \quad (6)$$

Exploitation phase

Literature education, the exploitation phase includes in-depth text study and interpretation with an emphasis on literary devices, themes, and character development. Students interact critically with the text to reveal hidden meanings and understanding of the viewer's purpose and style.The equation $Pos(s+1)$ represents the position (Pos) at the next time step $(s+1)$, which is determined by the current position $(Pos(s))$, adjusted by the various texts between the position adjustment $(Pos\_ad(s))$ and a random factor $(rand(0,1))$, scaled by another position-related factor (Pos_c) in equations (7) and (8).

$$Pos(s+1) = s \times (Pos_{ad}(s) - rand(0,1) \times Pos_c \quad (7)$$

$$pos_{qmc} = |rand(0,1) \times pos_a(s) - pos_d(s)| \quad (8)$$

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- **consecutive convolutional neural network (CCNN)**

Poetic line analysis could be improved by CCNN is used in literary teaching. CCNNs can identify patterns in language usage by segmenting poetry into smaller units. It assists the school student in literature education by helping them understand the structure and meaning of poetry. The encoder component of semantic representation keywords is the primary function that represents the text material into a semantic vector that is calculated by the computer. The primary application for one-dimensional CCNNis in NLP applications. Data with an established grid layout is frequently processed using CCNN,a particular kind of DL approach to NLP, computer vision, and time sequence evaluation, it is frequently employed. One-dimensional, two-dimensional, and three-dimensional convolutions represent the classifications for CCNNbased on the types of data streams it process. NLP and time series analysis both make extensive use of one-dimensional convolution to include the convoluted kernel's variable using equation (9).

$$S(d) = l\left(\sum_{j,i}^{n} \partial_{(n-i)(m-j)} c_{ji} + b\right) \quad (9)$$

Word representation as a vector process is also referred to as the layers of embedding that submitted sequence number, which is suitably transformed into a vector of a certain length following the embedding layer of $E_f(c)$ equations (10) and (11).

$$E_s = f_f(b_s) \quad (10)$$

$$l_{e,s} = g_e\left(f_{f,s}, g_{e,s-1}\right) \quad (11)$$

The idea of a multilevel network, which primarily resolves linear separable difficulties, is offered alongside the hidden layer suggestions. Two network layers constitute the foundation of bidirectional hidden layer, a forward CCNNbackward network to comprehend the input phrase, to more completely collect stage of two distinct points of view: positive order and reverse order the words using equations (12) and (13).

$$g_{a,s} = g_b\left(f_{f,s}, g_{a,s+1}\right) \quad (12)$$

$$g_{as} = e\left(g_{f,s}, g_{a,s}\right) \quad (13)$$

Equation (14) described NLP deep network s is a vector effort in the field of abstracted high-level aspects of language for the purpose to better comprehends language.

$$g_{t,s} = g\left(g_s, g_{t,s-1}\right) \quad (14)$$

Equation (15) $E_{c,s}$ is hidden layers in actual applications to get more advanced capabilities in accordance with specification in poetry.

$$E_s = j_c(b_s) \quad (15)$$

4. Result Analysis

To analyze the performance of proposed ASCS-CCNN method in terms of similarity, tone accuracy and rhyme accuracy, compare student performance in poetry education with other existing methods such as Bidirectional Encoder Representations from Transformers (BERT) [15], Quality Aware Masked Language Model (QA – MLM) [15], Bidirectional Long Short-Term Memory- Conditional Random Field (BiLSTM – CRF) [15] that is explained in detail. Table 2 shows the numerical outcomes of similarity, tone accuracy, rhythm accuracy.

Table 2: Numerical Outcomes of Similarity, Tone Accuracy, Rhythm Accuracy

Models	Similarity	Tone accuracy	Rhythm accuracy
BERT [15]	83.6	91.3	99.7
QA - MLM [15]	85.6	90.4	97.8
BiLSTM - CRF [15]	85.7	90.9	98.4

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ASCS-CCNN [Proposed]	98.2	95	99.9

4.1 Similarity

A poem's coherence and consistency across lines might be naturally measured using similarity character embeds could indicate similarities in certain situations. Sentence-level analysis, embeddings of each character are obtained for each phrase, integration, and cosine similarity compute similarity between two lines, more resemblance, and higher quality of the poetry. The comparison evaluation of the similarity with existing and proposed method is shown in Figure 5, compared to other existing methods, our method attains 98.2% while the existing methods have obtained BERT (83.6%), QA - MLM (85.6%), BiLSTM - CRF (85.7%). It shows that our proposed technique is more efficient than other existing methods.

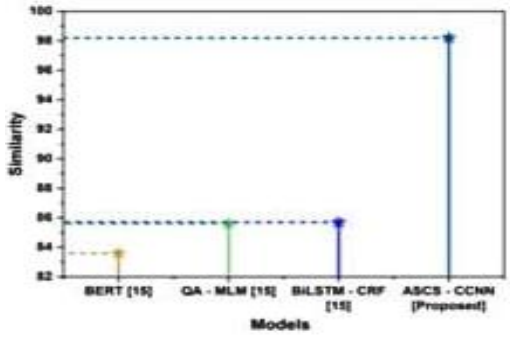

Figure 5: Result Of Similarity

4.2 Tone accuracy

Tone accuracy was used to test correctness of poetic metrics, proportion of words in a poem that have the appropriate tone relative to the total number of words is called tone correctness. The comparative analysis of the tone accuracy with existing and proposed method is demonstrated in Figure 6, compared to other existing methods, our method achieves 95 % and existing techniques are BERT attains 91.3%, QA-MLM achieves 90.4%, BiLSTM - CRFachieves 90.9%. It demonstrates that our suggested method is more effective than other current approaches.

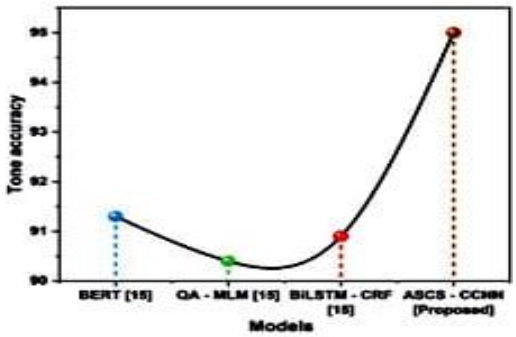

Figure 6: Result of Tone accuracy

5. Rhythm accuracy

The percentage of poems that rhyme correctly to all poetry is known as rhyme accuracy, for example in Sun Fun, the poem's rhyme scheme is included in rhyme embedding. To assess rhyme accuracy, divide the number of pairs that rhyme properly by the total number of rhyme possibilities in a poem. The term may pertain to the manner in which rhymes are included or embedded in a poem's structure, potentially communicating in the depth. The comparative analysis of the rhyme accuracy with proposed and existing methods are shown in Figure 7, when compared to other existing methods, ASCS-CCNN method (99.9%) and accessible approach include BERT

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(99.7%), QA - MLM (97.8%), BiLSTM - CRF **(**98.4%). It indicates that the strategy we have proposed is superior to the current ones.

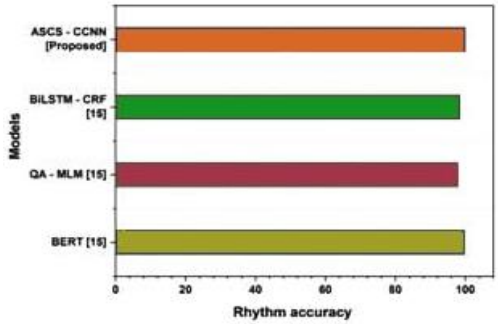

Figure 7: Result of Rhythm accuracy

5.1 Student Performance in poetry education

Student evaluation in poetry education includes four dimensions: consistency, fluency, meaningfulness, and poutiness, which are used to rank the resulting poems by 10 highly educated annotators. To represent low to high quality, each dimension is given a number between 1 and 5. The comparison of the student performance in poetry education with existing and proposed method is shown in Table 3 and Figure 8. Our proposed method achieves in Consistency (4.88%), Fluency (5.02%), Meaningfulness (4.94%), and Poutiness (4.82%). Results indicate that our suggested method outperforms the current ones.

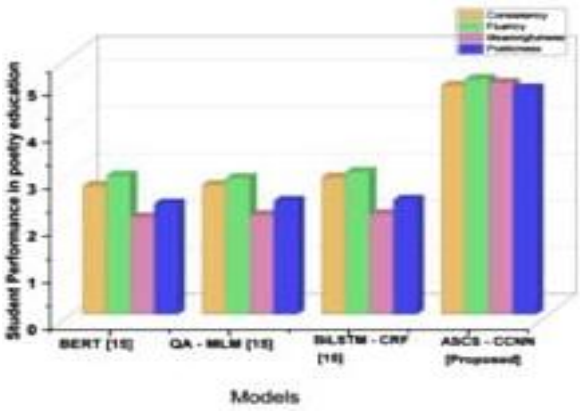

Figure 8: Result Of Student Performance in Poetry

Table 3: Numerical outcomes of student performance in poetry education

Models	**Student Performance in poetry education**			
	Consistency	Fluency	Meaningfulness	Poeticness
BERT [15]	2.74	2.96	2.07	2.36
QA - MLM [15]	2.76	2.91	2.12	2.42
BiLSTM - CRF [15]	2.92	3.04	2.14	2.44
ASCS - CCNN [Proposed]	4.88	5.02	4.94	4.82

6. Conclusion

Significant developments might be identified with the use of deep learning networks in preschool and secondary literary education. Such approaches improve student engagement with interactive material, efficiently customize learning experiences, and provide intelligent suggestions based on the likes and demands of each individual

student. There are many obstacles facing literature education, including inaccurate education, lack of varied ideas, inadequate investment, and restricted access to materials. The problems impede students' development of analytical skills and involvement in poetry education. Our proposed ASCS-CCNN method overcomes the problem and improves the poetry fluency, literature strategies. The finding result of student performance in poetry education Consistency (4.88%), Fluency (5.02%), Meaningfulness (4.94%) and Poeticness (4.82%), our proposed model has superior performance. A lack of comprehensive literature and educational resources about the ASCS-CCNN impedes its widespread comprehension and use. Because of its intricate design, which demands specialized expertise, its usefulness and accessibility are constrained in larger settings. Future scope involves integrating deep learning network into literature education across the primary and secondary to develop poetry comprehension and enhance student engagement in critical thinking by leveraging advanced computational methods in literary studies.

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