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Application of Random Forest Algorithm in English Innovative Talent Cultivation Mode in Colleges and Universities

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Abstract: - This research investigates the integration of the Random Forest Algorithm within the framework of English Innovative Talent Cultivation Mode in higher education institutions. The study uses a performance evaluation approach to examine the algorithm's impact on student learning outcomes and instructional methodologies. The algorithm's usefulness in improving outcomes and personalizing instructional approaches is examined using descriptive statistical analysis. The findings demonstrate the algorithm's potential to change English language education by providing useful insights into student performance that can drive instructional decisions. This study emphasizes the relevance of refining talent development tactics and cultivating innovative English language skills among students, thus contributing to the growth of educational practices in colleges and universities. As a result, using the Random Forest Algorithm in this scenario has the potential to revolutionize teaching practices while also encouraging a culture of continual improvement and innovation in English language acquisition.

Keywords: Random Forest Method, Performance Evaluation Model, English literature.

I. INTRODUCTION

In today's dynamic educational environment, schools and institutions worldwide must prioritize the development of innovative talent. Among the many issues that educators confront, one critical part is the development of English language competency, which is becoming increasingly important in our interconnected global society [1]. Traditional teaching methods frequently struggle to satisfy students' different requirements and learning styles, necessitating a search for new alternatives. In this environment, advanced data-driven techniques, such as the Random Forest Algorithm, appear to be a promising answer [2].

A student performance evaluation model uses a variety of ways to assess academic progress. Formative evaluations provide continual feedback, whereas summative assessments evaluate overall mastery [3]. The Random Forest Algorithm, known for its robustness and predictive power, has been widely applied in a variety of fields, including finance and healthcare. Its versatility and effectiveness make it an excellent tool for gleaning significant insights from large datasets. Its potential to disrupt the traditional teaching paradigm in education, particularly in the field of English language learning, is being widely acknowledged [4][5].

This research examines the use of the Random Forest Algorithm in the context of English Innovative Talent Cultivation Mode in colleges and institutions [6]. Using this technique, instructors can harness the power of data analytics to acquire a better understanding of student learning habits, preferences, and performance indicators. Such insights allow for the modification of teaching tactics adapted to individual student needs, hence maximizing the learning experience and effectively developing innovative potential [7].

In this study, we look at the theoretical foundations of the Random Forest Algorithm and how it applies to the educational landscape. Researchers explore how this algorithm can be smoothly integrated into existing performance evaluation frameworks, hence improving teaching approaches and student outcomes [8]. Additionally, they look at case studies and practical implementations of the Random Forest Algorithm in educational settings, emphasizing its effectiveness and potential impact on talent development. Through this research, they hope to equip educators, administrators, and policymakers with a thorough knowledge of the Random Forest Algorithm's transformational potential in English Innovative Talent Cultivation Mode [9][10]. By adopting data-driven

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methodologies, schools and institutions can go on a path to create a more engaging, personalized, and successful English language learning environment, developing the innovative abilities of future generations [11].

II. Literature Survey

Poza-Lujan, J. L., et al [12]. investigated if a computer engineering degree initiative, a first-year foundation course, requires more labour while establishing continuous evaluation at the Technical University of Valencia, Spain. It assessed maybe it was an increase in teacher effort in different situations and how it affected student performance. Standard and intense continual assessment approaches were compared, the latter results in a greater number of examinations and exams than the former. The test outcomes show that constant assessment can increase student performance, however, it can be difficult for instructors, and kids' scores were not considerably influenced.

Yan, Q., et al [13]. designed the performance assessment for students who do not major in English using the Roche multidirectional tree clustering method. The assessment outcomes revealed that the Roche multidirectional tree clustering scores of college students who did not major in English were allocated on an intermediate scale. Overall, English performance and Roche multidirectional tree clustering did not show a significant correlation. Classroom English demands teachers to create a pluralistic teaching evaluation model that educates students based on their skills to encourage complete growth.

Asiah M et al [14]. evaluated the academic achievement of pupils to enhance the standard of learning and assist them in flourishing in their studies. Using predictive analytics can assist educational institutions in more informed judgments. Staff evaluated recent studies activity linked to academic analytics are used to forecast students' academic performance, and offered alternative strategies for developing best accomplishment models utilizing student information. Models for predicting student accomplishment are many learning classification problems associated with the models optimized by testing them with variables to determine the maximum powerful qualities used for estimate. Accurate prediction of performance takes learners through the procedure and keeps them from earning bad results. The framework helps the educator determine the amount of student completion of the course and the final grade related to student performance.

Gao, Z et al [15]. The most important parts of learning improvement include student evaluations of the effectiveness of teaching along with tracking of teaching quality. A multiple-level student evaluation system for performance has been created using an integrated framework and online student assessment methodologies. New Internet-based assessment technique is used to improve student learning effectiveness and teacher enthusiasm. In addition, using the Internet platform, student teaching assessment was studied to garner support for boosting student understanding and optimizing teacher assessment.

III. Methodology

A. Student Performance Evaluation Model

A student performance evaluation model includes a variety of approaches and strategies used by educators and institutions to assess and quantify students' academic progress, accomplishments, and skills. It entails acquiring, evaluating, and interpreting data on students' learning outcomes, actions, and skills to provide useful feedback and drive instructional decisions.

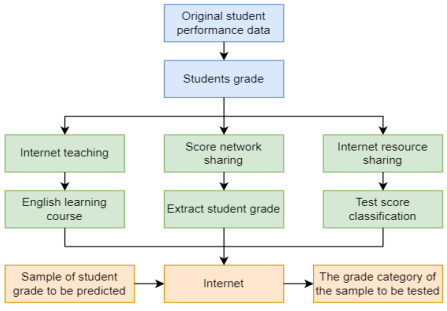

Fig 1: Student performance evaluation model.

This methodology often includes a mix of formative and summative assessment procedures adapted to the learning objectives and circumstances. Formative assessments, such as quizzes, class discussions, and homework assignments, are used throughout the learning process to test student comprehension and provide instant feedback for improvement. Final evaluations, such as exams, projects, and presentations, are used at the end of a learning period to assess overall performance and understanding of course material. Furthermore, student performance evaluation models may include qualitative measurements such as instructor observations, student self-assessments, and peer evaluations to provide a more complete picture of students' academic growth and development. Educators can use successful performance evaluation models to identify areas of strength and areas for progress, personalize education to particular student requirements, and help students attain their full academic and personal potential.

B. Random Forest Algorithm

The Random Forest Algorithm has the potential to alter teaching approaches and improve student learning experiences. This approach works by creating an ensemble of decision trees, each trained on a random portion of the training data and characteristics. This algorithm, when used in English language teaching, may extract significant insights from enormous databases of student performance indicators, language proficiency levels, and learning preferences. Educators can use this data to uncover patterns and trends in student behaviour and performance, allowing them to customize instructional tactics to meet the needs of each student.

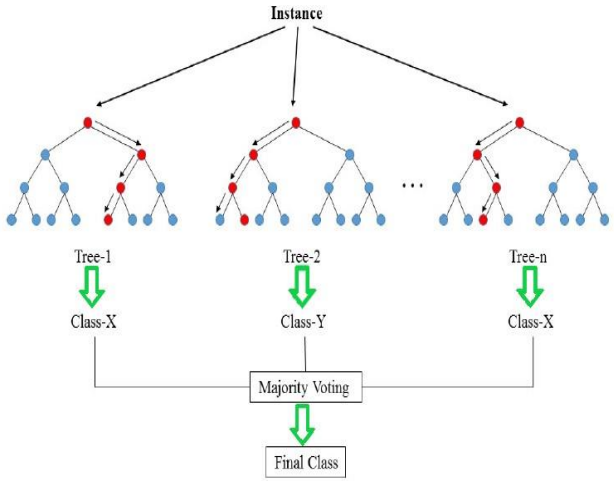

Fig 2: Illustrate random forest algorithm.

The Random Forest Algorithm can dramatically improve student-centered teaching approaches. Using the algorithm's predictive powers, educators can anticipate students' strengths, limitations, and learning styles, allowing for the construction of individualized learning experiences. For example, the algorithm can identify students who could benefit from extra help or enrichment activities based on their performance in specific language skills or themes. Furthermore, it can provide personalized resources and materials to meet different learning styles, such as interactive multimedia content, language games, or real-world language immersion experiences.

The Random Forest Algorithm allows for the early discovery of potential learning hurdles or regions of difficulty for students. By constantly monitoring student progress and engagement, educators may intervene quickly to give targeted support and remediation. For example, if the algorithm discovers a pattern of difficulty with specific grammatical topics among a set of students, educators might change their teaching style, offer more practice activities, or provide supplementary instructional resources to successfully address these challenges.

Additionally, the algorithm's capacity to handle big datasets and nonlinear interactions makes it ideal for investigating complex language acquisition dynamics. It can reveal intricate relationships between numerous elements influencing language acquisition, such as sociocultural background, learning environment, and motivation levels. Understanding these deep relationships allows educators to customize their instructional tactics, resulting in a more inclusive and culturally responsive learning environment that supports students' unique gifts and language abilities.

IV. RESULTS

This action research focused on X College. A one-year and two-month experiment was conducted using Reading habits in the control class, Choice 1 (52 students), and the experimental class, Choice 2. Classroom observations, assessments, interviews, and questionnaires were used to cultivate and improve the higher-level thought and disciplined synthesizing skills, in addition to their reading and writing abilities. The experimental class will employ a random forest algorithm to teach English literature, whilst the control class will proceed to utilize the standard technique.

The pre-test and post-test will be scored on four dimensions: students' thinking quality training in gathering particular knowledge, judgment, reasoning, and transforming capacity, able to summarize the essential idea and writing objectives and practical abilities. The effect of adopting the training technique proposed in this study will examine the quality of pupils' thinking by analyzing transcripts from the pre-interview and post-interview.

Table 1 displays the outcomes of the students' pre-test and post-test performance as a consequence of studying the effect of education from two viewpoints: reading and writing ability. In the pre-test, the variance between the control class and the experimental class is just 0.14, indicating that there is no apparent distinction comparing the two kinds of classes. However, in the post-test, the experimental class demonstrated a significant variance from the control class, with a variance of (0.14,2.7), indicating that the English learning developed in this research has the potential to increase student performance.

Table 1: Statistics on student performance.

Test content	**Pre-test**			**Post-test**		
Reading abilities	Control class	Experimental class	Variance value	Control class	Experimental class	Variance value
Facts	4.43	4.36	-0.05	4.50	4.60	0.14
Logical reasoning	6.50	6.47	-0.04	6.57	7.80	1.24
Writing purpose	2.81	2.87	0.05	2.66	3.73	1.05
Abstract application	2.14	2.07	-0.06	2.37	3.68	1.30
Writing abilities	Control class	Experimental class	Variance value	Control class	Experimental class	Variance value
Logical	3.87	3.90	0.02	3.85	6.60	2.7
Consistency	4.08	4.04	-0.03	4.40	5.50	1.10
Accurateness	5.75	5.60	-0.13	5.80	5.95	0.13

A statistical assessment of reading abilities was performed, and Table 2 displays group statistical analysis in the control and experimental classes. The mean scores in the control and experimental classes are 3.84 and 4.44, with a 0.60 variance. The standard deviation variance among the control (1.30) and experimental (1.48) classes is only 0.17, with a test value of 0.003. There is a statistically important variance in the reading capacity of the two sets of pupils, and creative Teaching English literature in colleges and universities based on a random forest algorithm can greatly evaluate the increase in students' reading abilities.

Table 2: Statistical findings for the control and experimental classes.

Class	**N**	**Mean**	**Std.**	**Std. of Mean**
Control class	50	3.84	1.30	0.187
Experimental class	47	4.44	1.34	0.190

	Levene		T						
	F	Sig.	T	Freedom	Double tail T	Mean Difference	Std	Min	Max

Variance phase is assumed.	0.032	0.003	-0.14	78.32	0.74	-0.04	0.23	-0,54	0.51
Unequal variances are assumed			-0.14	78.45	0.74	-0.04	0.23	-0.55	0.51

The descriptive statistical analysis is used to evaluate students' writing skills in English literature. The research revealed substantial disparities in writing skill dimensions, as shown in Table 6. The paired-sample t-test findings revealed a unique distribution value of 2.81 and a matching significance level (Sig.) of 0.001, showing a statistically significant difference in writing skill scores between the pre-test and post-test. In particular, the post-test scores for logic, criticality, and originality were Slightly greater than the level pre-test scores, with t-distribution values of 5.42, 2.66, and resulting Sig. values of 0.000, and 0.005, showing significant increases.

Table 3: Variations in the aspect of writing abilities.

Dimension	**Stage**	**Mean**	**Std.**	**T**	**Double tail**	**Average value-added**
Logic	Post-test	3.54	0.884	2.80	0.001	0.57
	Pre-test	2.85	0.723			
Criticize	Post-test	2.32	0.821	5.40	0.000	0.80
	Pre-test	2.50	0.752			
Create	Post-test	3.07	0.780	2.65	0.005	0.47
	Pre-test	2.54	0.707			

This study has the potential to dramatically increase students' English reading and writing skills, as well as capture the key of the English literature through a student performance evaluation model using a random forest algorithm.

V. Discussion

It demonstrates considerable gains in students' writing ability across multiple aspects following the implementation of the English literature intervention. The study found statistically significant differences between pre-test and post-test scores for logic, criticality, and creativity. The increase in scores indicates that the intervention improved students' writing skills in these areas. Specifically, the study of logic scores demonstrates a significant improvement, with post-test scores much higher than pre-test results. This suggests that students' logical reasoning and coherence in writing improved after the intervention. Similarly, criticality scores have increased significantly, indicating an improvement in students' capacity to critically assess and evaluate texts. In addition, the results for originality scores show a significant improvement in students' inventive and innovative writing talents. The considerable difference between pre-test and post-test scores implies that the intervention increased students' writing creativity by pushing them to try new ideas and viewpoints. The study's findings demonstrate the effectiveness of the English literature intervention in improving students' writing abilities across multiple dimensions. The large improvements in logic, criticality, and creativity scores demonstrate the intervention's excellent impact on students' overall writing competency. These findings have significant implications for curriculum creation and teaching practices targeted at enhancing students' English language skills and encouraging creative writing.

VI. Conclusion

The Random Forest Algorithm, when used in conjunction with the student performance evaluation model, provides a strong approach to improving English language instruction in colleges and universities. Using the Random Forest Algorithm's predictive powers, educators can acquire useful insights into their students' learning habits, preferences, and performance indicators. This data-driven method allows for the modification of teaching strategies based on individual student needs, resulting in a dynamic and personalized learning environment. Additionally, incorporating the student performance evaluation model enables continuous assessment and feedback, allowing educators to track students' development, identify areas of strength and weakness, and provide targeted assistance and intervention as

needed. Together, these techniques help students build innovative English language abilities, promoting ongoing growth and development. As colleges and universities strive to adapt to the changing educational landscape, the synergistic combination of the Random Forest Algorithm and the student performance evaluation model provides a transformative pathway for optimizing English language education and nurturing future generations' talents.

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