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Advancing Employability Predictions in Autonomous Institutions Through Machine Learning: A Contrast with Non-Autonomous Institutes with Reference to Technical Institutes

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Abstract

Education system is undergoing significant transformation, evolving societal needs, and a shift towards more student-centric learning. The employment of students is major concern of any educational institutes. In today's Era many technical institutes enhanced Academic Standards by availing autonomy. Autonomy offers the freedom to innovate, improve academic quality, and respond to the evolving needs of students and the industry. As compared to non-autonomous technical institutes. Institutes become more flexible, student-centric, and research-oriented and hence promoting accountability and continuous improvement of a students. As a result, autonomy can lead to better academic outcomes, better employability for students, and a stronger institutional reputation. The use of machine learning is helpful to forecast which student will and will not be employed specially in autonomy.

This research will compare use of ML to predict employability ration in technical autonomous and technical non-autonomous institutes by considering few parameters.

Keywords: Employability, Employability Prediction, autonomy, non-autonomous institutes, Machine learning, Machine Learning

INTRODUCTION

Employability is a primary metric of success for educational institutions. It's all about refers to the Expertise spectrum, knowledge, Personality features and attributes that make an individual to equipped for entering into the workforce, remain employed, and progress in their career. It reflects a person's ability to be employable, not only in terms of securing a job but also in adapting to changes in the workplace, contributing effectively, and meeting employer expectations. Employability rates significantly influence how an institution is

perceived in academic and professional circles**.** Predict employability of students at early stage of academics using ML will be helpful for institute to enhance employment success percentage.

The integration of ML tools suggests which student will and will not be employed will guide them in the progress of their career.

The main objective of institutes is to enhance employability by improving academic quality through learning innovations like E -learning, blended learning, collaborative learning, interdisciplinary etc.

Employability is shaped by a blend of skills, knowledge, and personal attributes developed through appropriate educational and training initiatives.
Autonomous colleges play a significant role in advancing students' employability through tailored academic programs and specialized initiatives.
Non-autonomous colleges strive to enhance employability through dedicated initiatives, though their scope is often restricted by external dependencies and limited autonomy.
ML can help both autonomous and non-autonomous colleges to recognize gaps in their curricula compared to industry needs, offer career path recommendations based on student data, and analyse placement histories to discover future trends, driving meaningful partnerships with industries.
The effectiveness of education is greatly amplified by autonomy, which facilitates decision-making in curriculum design, instructional methods, and examination frameworks, positioning it as a key institutional advantage
Autonomous colleges have a unique benefit to improve employability because of flexibility in designing program's structure, development of innovation, and aligning with industry needs.
This paper represents Using Machine Learning to Refine Employability Forecasting in technical Autonomous Colleges Compared to technical Non-Autonomous Ones.

Introduction to Machine Learning

Machine Learning, a critical aspect of AI, develops systems that improve autonomously by analysing data and learning from it without requiring explicit programming. It includes algorithms and statistical models that identify patterns in data and make predictions, decisions, or classifications based on that data. With its ability to customize learning, boost efficiency, and generate actionable insights, machine learning is transforming the educational landscape. Machine Learning (ML) methods have transformed the way we interact with data and have increased the potential of recognising patterns and making sense of large volumes of data [3]
Machine learning identifies and connects hidden patterns across datasets, synthesizing relationships among variables to reveal deeper insights and enable predictive, data-driven decision-making **and programming computers to optimize a performance criterion using example data or past experience**.

ML methods typically include three categories:

1. **Supervised learning**: The algorithm is trained on labelled data in which the input characteristics are accompanied by matching output labels. The main goal is to learn a function that converts input to output.
2. **Semi-supervised learning**: The algorithm is provided with unlabelled data, where the input features do not have matching labels on the output. Without any prior knowledge about the output, the goal is to discover patterns and structure in the data
3. **Reinforcement learning:** In reinforcement learning, an algorithm learns decision-making skills by interacting with its environment. The goal is to learn a principle that optimises a reward signal.

Impact of Machine Learning in Technical Education

Education and artificial intelligence (AI) are two areas that have recently intersected, and Their convergence has opened up thrilling new opportunities for the future of education.ML technology can

improve learning experiences by providing personalized content, instant feedback, and advanced analytics. It can improve student engagement, motivation, and learning outcomes.
Remember, Machine learning doesn't replace teachers., it acts as a supportive tool.

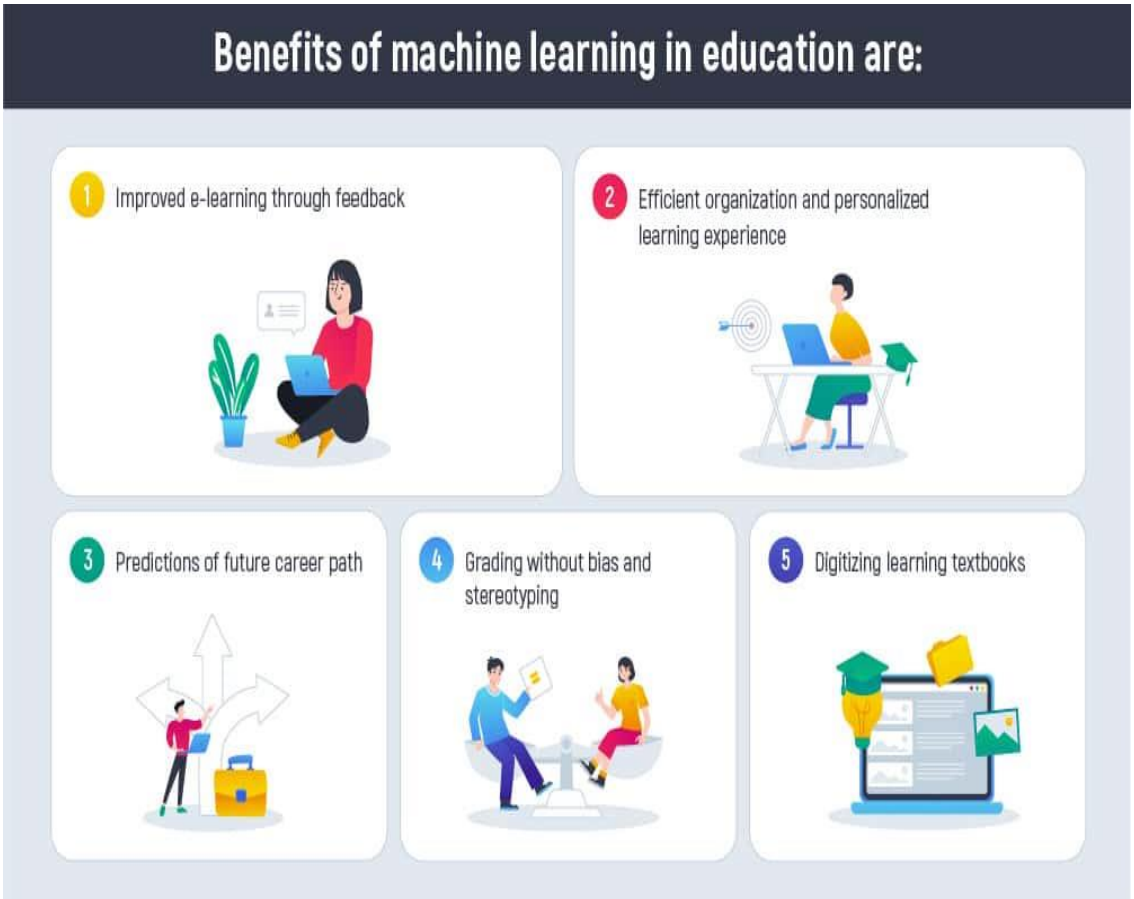

Image reference : https://piogroup.net/blog/machine-learning-in-education-benefits-and-impact

Comparative Analysis

1. Flexibility

Autonomous Institutions

It provides flexibility in Designing of course structure and may include ML-driven modules like predictive analytics to ensure employability factors are embedded in learning. Machine learning facilitates employability enhancement by enabling the introduction of career guidance systems and specialized training initiatives. The Beauty of autonomy is, without external approvals it provides liberty to collect, analyse, and act on data.

With the advantage of flexibility, institutions can develop certification programs that cater to industry demands, providing technical institute students with better opportunities to enter the industry.

Integrating ML tools allows for the analysis of large datasets, making it possible to assess the employability of individual students.

As a result, flexibility is key to enhancing employability, with ML being instrumental in its prediction.

Non-Autonomous Institutions

Comparatively limited control over syllabus design**.** Introducing skill-based courses or industry certifications often requires approval from the university. Academic calendar is set by universities and

semester duration is also short hence to provide certification apart from regular syllabi become difficult to manage. As a result, the lack of additional certification courses means students are unable to take advantage of them for placement, affecting their placement results. Employability prediction through machine learning is rarely integrated as adopting ML based approaches takes time because of Dependency on centralized policies. Restricted access to granular student data for predictive modelling.

2. Curriculum Adaptability

Autonomous Institutions

Autonomous colleges having own flexibility to design, update, and implement personalized curricula aligned to current educational and industry needs. This adaptability of autonomy permits institutions to provide relevant and high-quality education, making them more responsive to emerging trends and demands. Autonomous colleges have the ability to adjust their curricula using ML-driven insights, allowing them to identify high-demand skills and integrate relevant courses. Periodic course updates help maintain relevance to contemporary trends. Institutes tailor their curriculum to industry needs, facilitating job placement for students, while ML evaluates if this adaptability increases employability.

Non-Autonomous Institutions

Limited flexibility in syllabus designing as institutes are affiliated to universities. Updating syllabus is often slower process and subject to regulatory approvals. Restriction on elective options and interdisciplinary courses by the university. While colleges can arrange training programs through industry collaborations, their omission from the official curriculum often complicates time management within the regular academic schedule. However, the integration of **Machine Learning (ML)** can enhance adaptability by providing data-driven insights, even within these constraints. ML tools can assist in identifying gaps, predicting trends, and personalizing education, thereby indirectly supporting curriculum relevance. But integration of Machine Learning (ML) faces several restrictions due to the rigid syllabi structures, dependence on External Bodies, Resource Constraints.

3. Skill Development

Autonomous Institutions:

Autonomous colleges play a vital role in preparing students with the skills necessary to enter into the job market. Institutes can design their own industry-Relevant Courses, Skill-Oriented Electives, Project-Based Learning, Certification Programs, Communication Workshops, Leadership Development Program in collaboration with industry.

Despite having the flexibility to offer skill-focused courses not directly connected to academics, these courses are important for enhancing students' abilities.

Autonomy permits to implement innovative strategies to enhance skill development, and the integration of Machine Learning (ML) amplifies this potential.

ML tools can provide personalized learning paths, recommending courses, certifications, and internships tailored to individual students. It also creates data-driven strategies to prepare students for the job market.

Non-Autonomous Institutes:

Non-autonomous institutes follow standardized curriculums set by affiliated universities or regulatory bodies, which limits their flexibility in designing customized programs. Despite these constraints, non-autonomous institutions can try to implement different strategies to promote skill development among

students.

Non autonomous colleges also conduct various skill development courses but because of rigid curriculum they face challenges to design skill-oriented courses as compared to autonomous colleges. There is also restriction on list of skill based elective subjects as list is provided by affiliated universities. Standardized programs often fail to address diverse student needs.

Integration of ML approach can bridge the gap between standardized education and dynamic industry needs but for non-autonomous institutes affiliation is with universities and hence requiring regulatory authorization. While they face significant restrictions in implementing ML for skill development because of dependence on external framework, infrastructure, willingness of staff and inflexibility in academic schedule.

4. Industry Collaboration

Autonomous Institutes

Autonomous institutes hold a unique advantage in fostering industry collaborations and utilizing advanced tools like Machine Learning (ML) for placement forecasting.

ML insights help identify industry trends, enabling stronger collaborations and targeted placement drives.

Autonomous institutes, with their ability to innovate independently, Machine Learning (ML) for enhancing industry collaborations and optimizing placement strategies.

It recognizes difference between current student capabilities and skill set and industry expectations, allowing institutes to address these areas proactively.

ML can recommend career paths or industries best suited to individual students based on analysis of academic records, cocurricular activities and aptitude tests.

Institutions can predict placement success rates and optimize training accordingly with effective use of ML.

Non-Autonomous Institutes:

With no dedicated placement cells in many institutes, teaching staff are often responsible for placement efforts. This includes initiating MoUs with industries, which adds to their already demanding workload.

Factors such as restricted flexibility, insufficient adaptability of the curriculum, absence of industry-focused certification programs, and limited resources in the training and placement team may hinder the development of partnerships or training programs, impacting the ability to act on ML insights effectively.

5. Research and Innovation

Autonomous Institutions:

Many autonomous institutes have dedicated research and innovation cells to streamline the research process, manage intellectual property, and support startups.

Autonomous institutes can adapt their curriculum to the latest research and industry trends, often introducing specialized electives and research-oriented programs.

Institutes often receive funding from both governmental and private organizations for research projects, while partnerships with industries offer additional financial and technical resources.

Students benefit from the research-friendly environment and facilities, making them more competitive for R&D roles and enhancing employability outcomes.

Autonomy fosters research in ML applications, allowing institutions to innovate in employability forecasting techniques.
Students and faculty can collaborate on ML projects to refine forecasting models.

Non-Autonomous Institutes:

Non-autonomous institutes, despite facing challenges due to limited academic and administrative independence, significantly contribute to research and innovation within standardized frameworks.
Non-autonomous institutes follow a centralized curriculum set by affiliated universities, leaving limited scope for introducing research-oriented courses or electives.
Research priorities and funding decisions are often subject to approval by affiliating bodies, reducing flexibility.
While some funding may be available through government schemes, the lack of autonomy often makes it harder to attract external funding or establish industry partnerships.
These institutes generally prioritize teaching over research, resulting in limited emphasis on innovation and fewer opportunities for faculty and students to engage in advanced research projects.

Conclusion:

Compare to non-autonomous technical institutes Autonomous colleges play a pivotal role in bridging the gap between academic learning and professional demands. Their ability to adapt to evolving industry needs, focus on holistic development, and provide personalized support ensures students are well-equipped for the competitive job market.
Through their autonomy, these colleges create dynamic and responsive educational environments that prioritize skill development. By aligning academic programs with real-world demands and fostering a culture of continuous learning, autonomous colleges empower students to excel in their careers and contribute meaningfully to society.
Such an environment is beneficial for boosting employability, and the integration of machine learning is valuable for predicting employability outcomes.

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