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A Study on the Anomalies of CGPA to Percentage Conversion in Higher Education Institutions

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***Abstract*-- The adoption of credit-based grading systems has significantly transformed academic evaluation in higher education institutions worldwide. Most universities now use Grade Point Average (GPA) or Cumulative Grade Point Average (CGPA) to measure student performance. However, several institutions, employers, and competitive examination authorities continue to rely on percentage-based criteria for eligibility and evaluation. This dual system necessitates the conversion of CGPA into percentage marks. In the absence of a universally accepted conversion framework, universities adopt diverse formulas for grade conversion. These variations often produce inconsistent percentage equivalents for identical CGPA scores, leading to anomalies in academic evaluation.**

The present study examines the inconsistencies in CGPA-to-percentage conversion methods used by universities and highlights the implications of these anomalies. Using comparative analysis and statistical modelling, the study demonstrates how different conversion formulas generate varying percentage outcomes. The research further employs regression analysis to examine the mathematical relationship between CGPA values and derived percentages under different conversion frameworks. The findings indicate significant discrepancies in percentage outcomes depending on the formula used. These inconsistencies may affect student eligibility in higher education admissions, recruitment processes, and scholarship selection.

The study argues for the development of a standardized CGPA-to-percentage conversion framework to ensure fairness, transparency, and comparability in academic evaluation systems. Recommendations are proposed for regulatory bodies and higher education institutions to establish uniform conversion guidelines.

***Keywords*-- CGPA, GPA, Percentage Conversion, Academic Evaluation, Higher Education Policy, Regression Analysis**

I. INTRODUCTION

The evaluation of academic performance plays a crucial role in higher education systems across the world. Traditionally, universities have relied on percentage-based grading methods to assess student achievement. However, in recent decades many institutions have transitioned toward the **Cumulative Grade Point Average (CGPA)** system in order to provide a more standardized and continuous assessment framework. The CGPA system attempts to represent overall academic performance on a cumulative scale rather than through isolated percentage scores obtained in individual examinations.

Despite its advantages, the coexistence of CGPA and percentage-based evaluation systems has generated significant challenges in academic interpretation. Numerous universities adopt the CGPA grading model for internal evaluation, while external stakeholders such as employers, scholarship agencies, and postgraduate admission committees continue to rely on percentage thresholds. As a result, institutions often convert CGPA scores into percentage equivalents through internally developed formulas. These conversion practices, however, vary considerably across institutions.

The absence of a uniform conversion framework leads to inconsistencies in the interpretation of academic performance. Students graduating with identical CGPA values from different institutions may receive significantly different percentage equivalents depending on the formula applied. Such discrepancies raise concerns about **comparability, fairness, and transparency** in academic evaluation. In competitive academic environments where eligibility criteria frequently depend on minimum percentage requirements, even small differences in conversion formulas may influence admission opportunities and employment prospects.

This study examines the anomalies that arise from institutional variations in CGPA-to-percentage conversion practices. By analysing conversion policies adopted by selected higher education institutions and comparing the resulting percentage equivalents, the research highlights the extent of discrepancies produced by different formulas. The study further explores the implications of these variations for students, universities, and policy makers, and proposes the need for a more standardized approach to academic grade conversion.

II. LITERATURE REVIEW

Scholarly discussions on academic grading systems emphasize the importance of consistency and transparency in the measurement of student achievement. Researchers such as Sadler (2009) argue that grading systems must accurately represent the level of learning demonstrated by students while also ensuring comparability across academic contexts. Similarly, Yorke (2008) highlights that variations in grading interpretation may create difficulties when academic credentials are evaluated across institutions.

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With the introduction of the **Choice Based Credit System (CBCS)** and the widespread adoption of the 10-point grading scale in India, many universities began implementing CGPA-based assessment frameworks. Regulatory bodies such as the **University Grants Commission (UGC)** have encouraged institutions to adopt credit-based grading mechanisms in order to enhance flexibility and academic mobility within the higher education system. While this transition has improved internal evaluation processes, it has also increased the need for reliable conversion mechanisms when grades are interpreted outside the institution where they were awarded.

Several institutions employ different formulas to convert CGPA values into percentage equivalents. For instance, some universities use a simple multiplier such as CGPA × 10, while others adopt modified formulas such as CGPA × 9.5 or (CGPA − 0.5) × 10. These variations can produce noticeably different percentage outcomes even when the underlying CGPA remains identical. Consequently, researchers have highlighted the need for greater standardization in grading interpretation to ensure equitable academic comparison across institutions.

The literature, therefore, suggests that although CGPA systems provide a convenient method for representing cumulative academic performance, the lack of a universally accepted conversion model may lead to inconsistencies in academic evaluation. Addressing this issue requires a systematic analysis of institutional conversion practices and their implications for academic decision-making.

In the context of Indian higher education, the **University Grants Commission (UGC)** introduced guidelines encouraging universities to adopt credit-based grading systems under the Choice Based Credit System (CBCS). However, the UGC guidelines allow institutions to determine their own CGPA-to-percentage conversion formulas. This flexibility has resulted in the emergence of multiple conversion formulas across universities.

For instance:

Institution Type	**Conversion Formula**
Formula A	Percentage = CGPA × 9.5
Formula B	Percentage = (CGPA − 0.5) × 10
Formula C	Percentage = CGPA × 10

Although these formulas appear similar, they produce different percentage outcomes for the same CGPA value. Existing literature suggests that the absence of standardised conversion mechanisms may create disparities in academic evaluation. However, empirical analysis of these anomalies remains limited. The present study attempts to fill this gap by conducting a comparative and statistical analysis of CGPA-to-percentage conversion methods. Table 1 describes the anomaly in the conversion of CGPA to percentages by 14 different Universities/Institutions of Higher Education.

Table 1:
CGPA of different Universities on different scales and their inconsistencies

A	B	C	D	E	F	G	H	I	J	K
Sr. No	University/ Institute	% of CGPA = 10	% of CGPA = 9.5	% of CGPA = 9	% of CGPA = 8.5	% of CGPA = 8	% of CGPA = 7	% of CGPA = 6	% of CGPA = 5	% of CGPA = 4
1	IIT, Kharagpur	100	95	90	85	80	70	60	50	40
2	Indian Institute of Space Science and Technology	95	90	85	80	75	65	55	45	35

3	Indian Institute of India, Roorki	95	95	95	90	85	75	65	55	45
4	University of Delhi	95	90.25	85.5	80.75	76	66.5	57	47.5	38
5	Visvesvaraya Technological University, Karnataka	92.5	87.5	82.5	77.5	72.5	62.5	52.5	42.5	32.5
6	Dr. Babasaheb Ambedkar Technological University, Lonere	92.31	87.69	83.08	78.46	73.85	64.62	55.38	46.15	36.92
7	Maharashtra National Law University, Nagpur	90	85.5	81	76.5	72	63	54	45	36
8	Savitribai Phule Pune University, Pune	88	83.6	79.2	74.8	70.4	61.6	52.8	44	35.2
9	University of Mumbai	83.5	79.88	76.25	72.63	69	61.75	54.5	47.25	40
10	Anna University	95	90.25	85.5	80.75	76	66.5	57	47.5	38
11	KTU	96.25	91.25	86.25	81.25	76.25	66.25	56.25	46.25	36.25
12	MAKAUT	92.5	87.5	82.5	77.5	72.5	62.5	52.5	42.5	32.5
13	IIT Madras	95	90	85	80	75	65	55	45	35
14	IIM Indore	Conversion formula from scale 4.33 downwards								

Source: Compiled by the Author

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III. Research Gap

The review of literature reveals that while several studies have examined grading systems and credit-based evaluation, limited research has focused specifically on the **anomalies arising from CGPA-to-percentage conversion formulas**.

Most existing studies address grading policy frameworks rather than analysing the mathematical implications of conversion methods. Consequently, there is a need for empirical analysis demonstrating how different formulas influence percentage outcomes.

This study addresses this gap by applying statistical analysis and regression modelling to evaluate the relationship between CGPA values and derived percentage equivalents under different conversion formulas.

IV. Objectives Of The Study

The present study seeks to achieve the following objectives:

1. To examine the methods used by universities to convert CGPA into percentage marks.
2. To identify anomalies arising from the use of different conversion formulas.
3. To analyse the statistical relationship between CGPA values and percentage equivalents.
4. To evaluate the implications of conversion anomalies for academic evaluation systems.
5. To propose recommendations for establishing a standardised conversion framework.

V. Research Methodology

The study adopts a **descriptive and analytical research design**. The research methodology involves three major components:

(a) Comparative Analysis

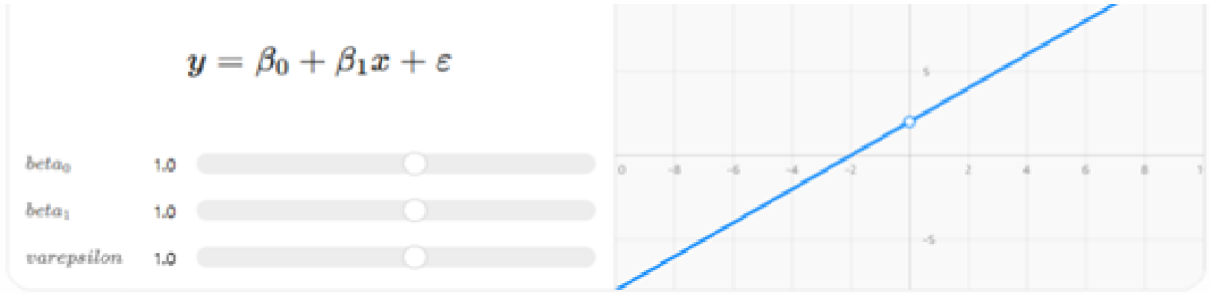
Different CGPA-to-percentage conversion formulas used by universities are examined and compared.

(b) Statistical Modelling

A dataset of CGPA values ranging from **5.0 to 10.0** is generated to analyse how different formulas convert CGPA into percentage marks.

(c) Regression Analysis

Regression models are applied to examine the mathematical relationship between CGPA values and percentage equivalents. The regression model can be represented as:



Where:

- y = Percentage equivalent
- x = CGPA value
- β_0 = Intercept
- β_1 = Slope coefficient
- ε = Error term

Figure 1 Regression Model

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VI. Comparative Analysis Of CGPA Conversion Formulas

Table 2:
CGPA vs Percentage (Different Conversion Methods)

CGPA	CGPA×9.5	(CGPA−0.5)×10	CGPA×10
6.0	57	55	60
7.0	66.5	65	70
8.0	76	75	80
9.0	85.5	85	90
9.5	90.25	90	95

The table clearly illustrates that **percentage equivalents vary significantly across formulas**.

For example:

- CGPA **9.5** may correspond to **90%, 90.25%, or 95%** depending on the formula used.

Such discrepancies may influence eligibility thresholds in admission or recruitment processes.

VII. Statistical Illustration

To understand the mathematical relationship between CGPA and percentage equivalents, regression analysis is applied. The regression model for linear conversion formulas can be expressed as

$y = mx + c$

VIII. Expected Results And Discussion (To Be Expanded)

Preliminary analysis indicates that:

- Conversion formulas produce **systematic deviations** in percentage values.
- Linear multipliers generate **predictable but unequal outcomes**.
- Adjustment factors introduce **non-uniform variations**.

These findings highlight the need for managerial **intervention to standardize grade conversion frameworks**.

IX. Managerial Implications

Standardisation of CGPA-to-percentage conversion would:

- Improve **comparability of academic performance**
- Reduce **evaluation ambiguity.**
- Ensure **fairness in admissions and recruitment.**
- Facilitate **international academic mobility.**

Developing a unified conversion framework would enhance transparency and comparability across institutions.

X. Institutional CGPA–To–Percentage Conversion Policies In Indian Higher Education

One of the most important causes of conversion anomalies arises from the fact that **universities independently determine their own CGPA–to–percentage conversion policies**. While many institutions follow a 10-point CGPA scale, the formula used to convert CGPA to percentage varies considerably.

A comparison of implications across **Indian Institutes of Technology (IITs), National Institutes of Technology (NITs), and Central Universities** demonstrates the absence of uniformity in conversion mechanisms.

(a) Conversion Policies in Indian Institutes of Technology (IITs)

The **Indian Institutes of Technology (IITs)** follow a credit-based grading system using a **10-point CGPA scale**. However, each IIT may adopt different methods for converting CGPA to percentage marks.

For example, **Indian Institute of Technology Delhi** provides guidelines for converting grading scales through linear interpolation to a 10-point GPA scale when necessary. The institute applies a proportional conversion formula for grade scales:

$$\mathbf{G = G_X \times 10 / X}$$ where

- G = GPA on a 10-point scale
- G_X = GPA on an X-point scale
- X = maximum grade point scale.

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This method standardises CGPA scales before interpretation during admissions or evaluation processes. Other IITs follow slightly different approaches.

Example IIT Conversion Practices

IIT Institution	Conversion Method
Indian Institute of Technology Bombay	Percentage = (CGPA − 0.5) × 10
Indian Institute of Technology Kanpur	Percentage = (CGPA − 0.5) × 10
Indian Institute of Technology Madras	Institutional conversion table
Indian Institute of Technology Delhi	Linear interpolation for GPA scale conversion

These variations demonstrate that even among **top technical institutions within the same national system**, a uniform conversion formula does not exist.

(b) Conversion Policies in National Institutes of Technology (NITs)

The **National Institutes of Technology (NITs)** also use a **10-point CGPA grading system**. However, most NITs convert CGPA to a percentage through a simpler linear multiplier.

Examples include:

Institution	Conversion Formula
National Institute of Technology Tiruchirappalli	Percentage = CGPA × 10
National Institute of Technology Warangal	Percentage = CGPA × 10
National Institute of Technology Karnataka Surathkal	Percentage = CGPA × 10

Under this approach, a CGPA of **8.5 corresponds to 85%**, which differs significantly from formulas used in some IITs where the equivalent percentage may be **80%** under the formula *(CGPA − 0.5) × 10*.

Thus, a student with identical academic performance may appear stronger or weaker depending on the institutional conversion rule applied.

(c) Conversion Policies in Central Universities

Central universities in India also exhibit considerable variation in CGPA conversion practices.

Examples include:

University	Conversion Formula
University of Delhi	Percentage = CGPA × 9.5
Jawaharlal Nehru University	Percentage = CGPA × 9.5
Banaras Hindu University	Percentage = CGPA × 10
Aligarh Muslim University	Percentage = CGPA × 9.5

For instance, under the **CGPA × 9.5 formula**, a CGPA of **8.5 converts to 80.75%**, whereas under the **CGPA × 10 formula**, it becomes **85%**. This difference of **over 4 percentage points** can significantly influence eligibility decisions for scholarships, postgraduate admissions, or employment opportunities.

XI. Comparative Institutional Conversion Table

To illustrate the anomalies more clearly, the following table compares percentage equivalents for the same CGPA across different institutional formulas.

Table 3:
CGPA–Percentage Equivalence under Different Institutional formulae

CGPA	CGPA×9.5	CGPA×10	(CGPA−0.5)×10
6.5	61.75	65	60
7.0	66.5	70	65
7.5	71.25	75	70
8.0	76	80	75
8.5	80.75	85	80

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This comparison demonstrates that **percentage equivalents may vary by up to 5 percentage points** depending on the conversion method applied.

Such differences may determine whether a candidate satisfies minimum eligibility thresholds such as **60%, 65%, or 75% requirements** in admission processes.

XII. Regression Model For Conversion Analysis

To analyse the mathematical relationship between CGPA and derived percentage values, the study applies a linear regression framework.

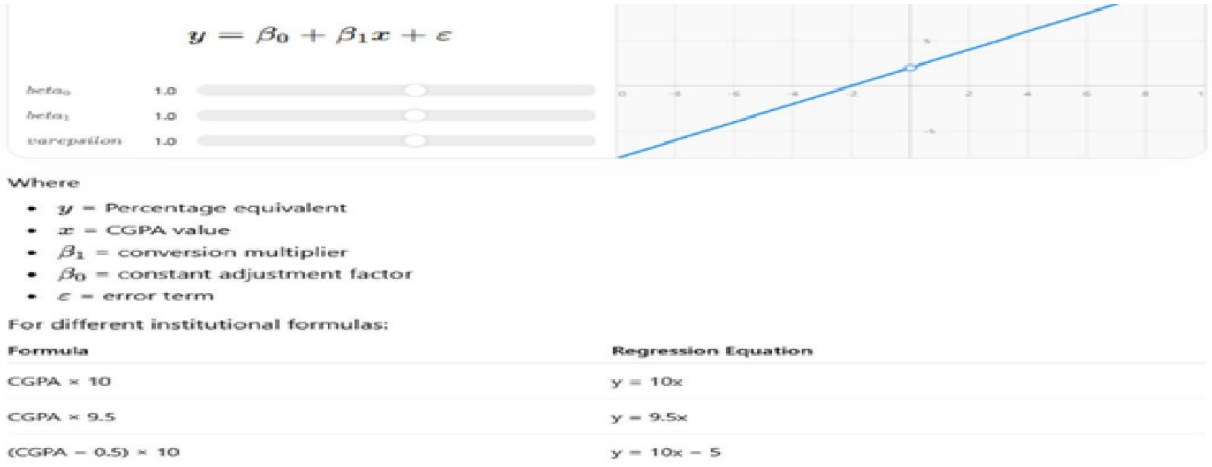

Figure 2: linear regression framework

For different institutional formulas:

Formula	Regression Equation
CGPA × 10	y = 10x
CGPA × 9.5	y = 9.5x
(CGPA − 0.5) × 10	y = 10x − 5

These equations demonstrate that differences in **slope and intercept values** produce systematic deviations in percentage equivalents.

XIII. Illustration Of Conversion Anomalies

Consider two students graduating with a **CGPA of 8.0**:

Institution	Conversion	Percentage
IIT (formula: (CGPA−0.5) ×10)	(8 − 0.5) ×10	75
NIT (formula: CGPA×10)	8×10	80
Central University (CGPA×9.5)	8×9.5	76

The difference between the highest and lowest values is **5 percentage points**.

This discrepancy may determine whether a candidate meets eligibility thresholds for:

- postgraduate admissions
- scholarships
- civil service examinations
- academic recruitment.

XIV. Implications For Higher Education Policy

The lack of a standardised CGPA conversion framework has several implications:

(a) Academic Inequality

Students from institutions using lower conversion factors may appear academically weaker.

(b) Admission Distortions

Universities comparing applicants based on percentage may unintentionally favour students from institutions with higher multipliers.

(c) Employment Disparities

Recruitment processes often use percentage thresholds (e.g., 60%, 70%, 75%).

(d) International Academic Mobility

Foreign universities evaluating Indian transcripts may face difficulty interpreting grade equivalence.

XV. Proposed Standardised Conversion Model

To reduce anomalies, the study proposes the adoption of a **uniform national conversion formula**:

$$\text{Percentage} = \text{CGPA} \times 10$$

Advantages:

- mathematically simple
- consistent across institutions
- transparent for admissions and recruitment.

Alternatively, a **national conversion table** could be introduced by the **University Grants Commission**.

XVI. Conclusion

The study demonstrates that the absence of a standardized CGPA-to-percentage conversion mechanism creates significant anomalies in academic evaluation systems. Different conversion formulas produce varying percentage equivalents for identical CGPA scores, potentially affecting student opportunities in admissions, employment, and scholarship selection.

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