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# Inquisitio

*Paths for Inquiry*

## **R&D News Letter**



**Jayaprakash Narayan College of Engineering  
(Autonomous)**

# *From the Chairman's desk...*

**K. S. RAVIKUMAR**

**Chairman**



At Jayaprakash Narayan College of Engineering (JPNCE), we believe in fostering a culture where knowledge meets innovation. Our mission is to nurture young minds into becoming leaders and contributors to society, equipped with the skills to tackle the challenges of tomorrow.

JPNCE has established itself as a beacon of excellence in technical education, combining state-of-the-art infrastructure with a commitment to research and holistic development.

We take pride in creating a platform that not only shapes capable engineers but also conscientious citizens. At JPNCE, we ensure that every student is imbued with moral values, discipline, and a sense of responsibility that prepares them for a dynamic world.

Together, let us ignite the spark of progress, guiding our students toward a brighter future.

“  
DREAMS TURN INTO  
GOALS  
WITH ACTION  
”

*From the Director's desk...*

**Dr. Sujeevan Kumar Agir**

**Director**

At Jayaprakash Narayan College of Engineering, Mahabubnagar, we are dedicated to creating a transformative learning experience that shapes students into confident, capable, and compassionate professionals. Our focus goes beyond imparting technical knowledge, we strive to instill a sense of purpose and responsibility in every individual.

We constantly adapt to the ever-changing landscape of education and technology, ensuring our students are equipped to meet global challenges.

We encourage students to not only excel academically but also develop leadership, ethical values, and a collaborative spirit. At JPNCE, every student is a part of a community that dreams big and achieves even bigger.

I invite all aspiring engineers and change-makers to join us on this exciting journey of discovery and success. Together, let's build a future that inspires and uplifts.

“  
EDUCATION BUILDS  
DREAMS  
INTO REALITY  
”

*From the Principal's desk...*

**Dr. Pannala Krishna Murthy**

**Principal**



Welcome to Jayaprakash Narayan College of Engineering, Mahabubnagar. Our institution has consistently strived to provide the best learning experience, producing some of the brightest technical minds of the future. At JPNCE, we focus on the overall personality development of our students.

We aim to inspire the next generation of engineers by providing access to esteemed academicians, including experts from IITs, NITs, and senior professionals who engage in thought-provoking interactions with students.

I hope all our students thoroughly enjoy their time here and, by the end of their academic journey, gain the necessary knowledge and skills to become not only competent professionals but also responsible and forward-thinking citizens of our nation.

“  
COMMITMENT  
DRIVES  
SUCCESS  
”

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## Cracks in the Foundation: The Hidden Costs of Workplace Harassment in Organizations

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### **ABSTRACT**

*This paper underscores the growing necessity for a conducive work environment to foster positive relationships between employees and management. Recognizing the significance of a proactive approach to addressing workplace harassment, organizations must implement well-planned and systematic education and training programs with realistic budgets. The success of any anti-harassment initiative hinges on a strategy that identifies, analyzes, and highlights techniques for eliminating harassment, demonstrating its impact on both individual and organizational productivity. Attention should be devoted to selecting the most suitable training providers and devising effective assessment methods. The study delves into the meaning, impact, various types of harassment, relevant legislation, and their collective influence on organizational productivity.*

**Keywords:** *Workplace harassment, organizational productivity, positive work environment, employee relations, management*

### **INTRODUCTION**

Numerous organizations recognize the imperative of adopting a proactive stance in addressing workplace harassment, as its repercussions extend to individuals directly involved, team members, and the entire organization.

The goal is to foster a workplace culture where all individuals treat their colleagues with dignity and respect, actively working to minimize instances of harassment. While having appropriate policies and procedures in place is crucial for effectively managing harassment, this guidance emphasizes that achieving success and cultivating a healthy organizational culture demand more than mere policy statements. Employers have a legal duty to safeguard employees' mental and physical health, extending protection

against harassment and violence. The guidance emphasizes the importance of a comprehensive written policy, developed collaboratively with staff, covering all employee grades and levels. Genuine and transparent consultation, including diverse perspectives, is essential to the policy's effectiveness, fostering trust and confidence between staff and management. Selecting a responsible board member underscores senior management's commitment to cultivating a healthy organizational culture and ensures a centralized and coordinated policy monitoring and review process.[1]

### **Defining Harassment**

Harassment, often equated to bullying in various research papers, is pervasive in workplaces and includes instances of sexual harassment. It is the result of the

misuse of power and encompasses unwelcome verbal or physical conduct based on protected attributes such as race, color, religion, sex, national origin, age, disability, or retaliation. While some may narrow the term to only denote sexual harassment, contemporary workplaces recognize its broader implications.

### **Impact of Harassment**

Harassment poses a substantial financial burden for businesses, contributing to low morale, absenteeism, diminished productivity, increased employee turnover, and incurred damages and litigation costs.

### **TYPES OF HARASSMENT**

Workplace harassment takes on various forms, involving verbal or physical mistreatment rooted in sex, religion, or race, constituting both unlawful behavior and a form of discrimination. Unwelcome, discriminatory conduct qualifies as harassment when its disruptive effects negatively influence the workplace. Supervisors engaging in harassment that results in discernible changes to an employee's salary or status are in violation of workplace harassment laws. This multifaceted issue, once thought to predominantly affect women, has become evident across genders, with females more frequently targeted by their male counterparts. The following delineates key types of harassment.[2]

#### **Psychological Harassment**

Psychological harassment encompasses humiliating, intimidating, or abusive behaviors that are often challenging to detect, relying on victim reports or complaints as primary evidence. Typically causing a decline in an individual's self-esteem or subjecting them to torment, this form of harassment manifests through verbal comments, staged intimidation episodes, aggressive actions, or repeated gestures. It includes workplace harassment, known as mobbing when

perpetrated by individuals or groups, and a subtype known as Community-Based Harassment, involving stalking by a group using repeated distractions. Examples include clicking an ink pen to sensitize the individual.

#### **Sexual Harassment**

Sexual harassment lacks a universally accepted definition, but a key emphasis is on unwelcome behavior of a sexual nature. It does not rise from mutual attraction, friendship, or respect, and consensual, welcome, and reciprocated interactions are not considered sexual harassment. It is a form of power abuse, not restricted to someone in a higher workplace position; for instance, male employees may harass their female boss, or a female employee may harass a male colleague.

Defined as an "unwelcome request for sexual favors or other unwelcome sexual conduct," it can be isolated or a series of incidents affecting anyone irrespective of gender. Sexual harassment, including physical harassment, may escalate to sexual assault and be deemed a criminal offense, encompassing physical molestation, offensive exposure, sexual assault, stalking, and obscene communications such as phone calls, emails, text messages, and letters. Examples include offensive verbal comments, sexual jokes, remarks about a person's alleged sexual activities, unwanted social invitations, stalking, stares, offensive gestures, and uninvited touching, kissing, or embraces.

#### **Racial Harassment**

Racial harassment targets individuals based on their race or ethnicity through words, deeds, and actions with the intention of making them feel inferior. Under the Equal Opportunity Act, racial harassment is deemed unlawful when someone threatens, abuses, insults, or taunts another person based on their race,

causing disadvantage or reasonable grounds to believe they will face objection or disadvantage. Prohibited in the workplace, education, and housing, racial harassment encompasses actions that create a hostile environment for individuals due to their racial or ethnic background.

### **Mobbing**

Mobbing involves the unlawful act of violence committed by a loosely affiliated and organized group without a proper trial. This violence aims to punish or execute a person for an alleged offense, ranging from serious crimes like murder to expressing unfavorable ethnic, cultural, or religious attitudes. The mob's actions are often independent of the victim's actual guilt or innocence, relying on unverifiable, unsubstantiated, or entirely fabricated claims.

### **DEGREES OF MOBBING[3,4]**

#### **First Degree**

Level involves instances where the victim effectively resists, escapes early on, or undergoes complete rehabilitation, either within the original workplace or elsewhere.

#### **Second Degree**

In this degree, the victim is incapable of immediate resistance or escape, experiencing temporary or long-term mental and/or physical disability. Additionally, they encounter challenges when attempting to reenter the labor force.

#### **Third Degree**

At this level, the victim cannot return to work and suffers from severe, enduring mental or physical disability.

### **Bullying**

Bullying is a form of harassment that can manifest on various fronts, such as the playground, school, workplace (whether sexual or verbal), or any other setting. It

involves both physical and psychological mistreatment directed at an individual by one or more perpetrators. Recent years have seen an alarming increase in the severity and prevalence of workplace and school bullying compared to earlier perceptions.

### **Stalking**

Stalking refers to the unauthorized pursuit and surveillance of an individual, reaching a point where the person's privacy is unacceptably violated, leading to the victim fearing for their safety. This actions entails willful and repetitive acts of following, observing, and harassing additional person, often driven by an attempt to establish a relationship against the unwilling or unavailable party. Unlike single-act crimes, stalking involves a series of actions over time. While stalking itself is illegal, actions contributing to stalking, such as information gathering, calls, gifts, emails, or instant messaging, are legal individually but can become abusive when repeated frequently.

### **Hazing**

Hazing involves deliberately and calculatedly subjecting an individual to persecution, harassment, or torture as part of an organized induction into a group. Typically associated with group initiation rituals, the targeted individual is often a subordinate or outsider, such as a fraternity pledge, a new employee, or a first-year military cadet. Hazing is illegal in many instances and is conducted with a planned approach.

### **RISK ASSESSMENT AND INCIDENT TRACKING MECHANISMS FOR BULLYING AND HARASSMENT[5]**

In accordance with health and safety legislation, the evaluation of workplace hazards, including psychosocial aspects, is imperative to mitigate risks and protect employees. The assessment process, applicable to both physical and



psychosocial issues, aims to identify necessary steps to control risks and ensure employee well-being. Illness resulting from bullying or harassment necessitates similar attention as physical ailments, compelling employers to take action and eliminate associated risks.

Access to information is integral to risk assessment, with existing management information systems capable of detecting stress-related issues stemming from bullying or harassment. Key indicators warranting further investigation include sickness absence, erratic timekeeping, increased patient complaints, rising counseling utilization, a surge in grievances, strained working relationships, and conflicts among colleagues. While these indicators lack a single cause, conducting a detailed audit can provide accurate information to address underlying causes, rendering interventions more effective. The preferred method for assessing the risks of workplace bullying and harassment involves obtaining feedback from individual employees through questionnaires, interviews, focus groups, or a combination approach.

Standard questionnaires designed to assess employee health and well-being exist, but customization to the organization's context can establish links between poor health and workplace stress. Ensuring confidentiality is crucial in encouraging employees to report incidents, and various reporting systems, such as existing accident forms, confidential telephone reporting, and dedicated forms for bullying or harassment incidents, can facilitate continuous monitoring.

### **Supporting Staff through Counseling**

Recognizing the stress and anxiety inherent in complaints and investigations related to bullying and harassment, appropriate support should be extended to all involved parties. Health care employers

increasingly offer independent counseling services in the workplace, acknowledging their value in providing support and guiding individuals involved in complaints to determine the best course of action. Counseling services may also be accessible privately or through voluntary sector organizations and some general practitioner services.

### **Promoting Healthy Workplace Environments**

Minor tensions within work teams are natural, and in healthy organizational cultures, these tensions can catalyze positive change. However, unresolved tensions can escalate into bullying and harassment if not promptly addressed. Overreliance on policies and procedures may not lead to early resolution, particularly if individuals are reluctant to complain or opt for leave. Proactive managers play a pivotal role in implementing anti-harassment and bullying strategies, requiring conflict resolution skills, understanding of legal responsibilities, and the ability to set standards of behavior.

Managerial training in conflict resolution, general management skills (coaching, mediation, delegation, performance reviews), and an understanding of the negative consequences of failing to address bullying and harassment are crucial. Studies on the prevalence of bullying and harassment highlight the importance of managers possessing effective leadership skills, differentiating between authoritative actions and consistently treating employees in a hurtful manner.

### **ABUSIVE CLIENTS/PATIENTS[6,7]**

The prevalence of violence and harassment directed at healthcare staff by patients, their relatives, and the public is on the rise. It is the responsibility of healthcare employers to ensure a secure working

environment for all staff members, necessitating the development of distinct policies and procedures to address this escalating concern.

**A Comprehensive Written Policy should Encompass**

- A firm commitment to safeguarding staff.
- A precise definition of violence, incorporating threats of violence and verbal abuse.
- Detailed information on relevant legislation, encompassing health and safety regulations and the Crime and Disorder Act 1998, along with reporting procedures.
- Clear procedures to be followed during and after an incident, inclusive of reporting protocols.
- Information on available support post-incident, offering opportunities for debriefing and access to counseling services.
- A written pledge to assist staff initiating criminal proceedings against the offender(s).
- Particulars about staff training.
- Details of relevant local plans and procedures involving community-based personnel.

Both employers and employees should collaboratively strive to minimize the risk of violent or threatening incidents. This includes explicitly informing the general public, including patients and their relatives, that any form of aggressive behavior towards staff is unacceptable and will not be tolerated. Healthcare organizations are urged to prominently display notices and posters communicating this stance to visitors. It is crucial to remind visitors that the organization constitutes private property. In instances of persistent inappropriate behavior, staff members should inform visitors, direct their attention to the posted notices, and, if necessary, coordinate with security staff

and the police to facilitate the removal of visitors from the premises.

**Policy on Harassment, Discrimination & Workplace Bullying - Legislative Framework:**

This policy aligns with and is governed by the following legislations:

- Public Service Act 1999
- Human Rights and Equal Opportunity Commission Act 1986
- Racial Discrimination Act 1975
- Sex Discrimination Act 1984
- Disability Discrimination Act 1992
- Age Discrimination Act 2004
- Occupational Health and Safety Act 1991
- Workplace Relations Act 1996
- Freedom of Information Act 1982
- Privacy Act 1988
- Crimes Act 1900
- Criminal Code 2002

**CONCLUSION**

While many organizations boast well-crafted policies against bullying and harassment, the gap often lies in the translation of these policies into actionable practices. Strict adherence to these policies is crucial, fostering a workplace where employees feel respected and comfortable.

Respectful behavior not only enhances productivity but also safeguards individuals from potential job loss due to inappropriate conduct. Moreover, harassment lawsuits bear personal legal and financial consequences for the harasser. To bridge the divide, consistent promotion of policies and procedures is essential, promoting heightened awareness of individual responsibilities, fostering understanding of acceptable behavior, and signaling ongoing commitment from senior management.

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**Cite Right: MLA, APA, Chicago, Harvard, Vancouver--Oh My!**

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**ABSTRACT**

Cite- MLA, APA, Chicago, Harvard, Vancouver" is a succinct guide illuminating the intricacies of citation styles prevalent in academia. This abstract provides a concise overview of the comprehensive resource, spanning MLA, APA, Chicago, Harvard, and Vancouver formats. It delineates the nuances of each style, facilitating accurate and consistent citation practices. Designed for students, researchers, and writers, this guide offers clarity on citation requirements, ensuring compliance with diverse academic conventions. From basic principles to advanced applications, Cite- MLA, APA, Chicago, Harvard, Vancouver" equips users with the knowledge and skills necessary for effective scholarly communication.

**Keywords:-** Citation styles, MLA, APA, Chicago, Harvard, Vancouver, Academic writing.

**INTRODUCTION**

In the realm of academia, effective communication of ideas is paramount, and accurate citation is the cornerstone of scholarly integrity. Various citation styles, such as MLA, APA, Chicago, Harvard, and Vancouver, provide frameworks for referencing sources in written works. Understanding these styles is essential for students, researchers, and writers to convey credibility and professionalism in

their work. This introduction serves as a primer for navigating the intricacies of each citation style, providing insights into their unique conventions, formatting requirements, and application in academic writing. By delving into the nuances of MLA, APA, Chicago, Harvard, and Vancouver styles, this guide aims to empower individuals to master the art of citation and uphold the standards of academic excellence.

	Cite
MLA	Srinivas, T. Aditya Sai, and S. S. Manivannan. "Prevention of hello flood attack in IoT using combination of deep learning with improved rider optimization algorithm." <i>Computer Communications</i> 163 (2020): 162-175.
APA	Srinivas, T. A. S., & Manivannan, S. S. (2020). Prevention of hello flood attack in IoT using combination of deep learning with improved rider optimization algorithm. <i>Computer Communications</i> , 163, 162-175.
Chicago	Srinivas, T. Aditya Sai, and S. S. Manivannan. "Prevention of hello flood attack in IoT using combination of deep learning with improved rider optimization algorithm." <i>Computer Communications</i> 163 (2020): 162-175.
Harvard	Srinivas, T.A.S. and Manivannan, S.S., 2020. Prevention of hello flood attack in IoT using combination of deep learning with improved rider optimization algorithm. <i>Computer Communications</i> , 163, pp.162-175.
Vancouver	Srinivas TA, Manivannan SS. Prevention of hello flood attack in IoT using combination of deep learning with improved rider optimization algorithm. <i>Computer Communications</i> . 2020 Nov 1;163:162-75.

[BibTeX](#) [EndNote](#) [RefMan](#) [RefWorks](#)

**Fig.1:-Cite Styles**

## STYLE GUIDELINES

Style guidelines in citation refer to the specific rules and conventions that dictate how sources should be formatted and presented in written works. These guidelines ensure consistency and clarity in citing sources, allowing readers to easily locate and verify the information referenced by the author. Each citation style, whether it be MLA, APA, Chicago, Harvard, or Vancouver, has its own set of style guidelines that govern various elements of a citation, including:

1. **Formatting of Author Names:** Style guidelines specify how author names should be presented in citations. This may include listing authors' last names followed by their initials, using full names, or utilizing et al. for works with multiple authors.
2. **Title Formatting:** Style guidelines dictate how titles of sources should be formatted. This includes rules regarding capitalization, italicization, or quotation marks for different types of sources, such as books, articles, and websites.
3. **Publication Information:** Style guidelines provide instructions for including publication information in citations, such as the title of the journal or book, the volume and issue number (if applicable), publication date, and page numbers.
4. **Inclusion of URLs and DOIs:** For electronic sources, style guidelines specify whether URLs or DOIs (Digital Object Identifiers) should be included in citations, as well as the format in which they should be presented.
5. **Order of Elements:** Style guidelines dictate the order in which various elements of a citation should be presented. For example, some styles may require listing

the author's name first, followed by the title of the work and then publication information, while others may follow a different order.

6. **Punctuation and Abbreviations:** Style guidelines provide rules for the use of punctuation and abbreviations in citations, such as periods, commas, colons, and semicolons. They also specify how to abbreviate certain words, such as "edition" or "volume."

7. **Footnotes and Endnotes:** Some citation styles, such as Chicago, may utilize footnotes or endnotes for additional information or commentary on sources. Style guidelines outline how footnotes or endnotes should be formatted and how they should relate to the main text.

8. **Consistency:** Overall, style guidelines emphasize the importance of consistency in formatting citations throughout a document. Consistent adherence to style guidelines enhances the readability and professionalism of written work, making it easier for readers to follow and engage with the content.

Understanding and following style guidelines is essential for maintaining accuracy and consistency in citations, thereby upholding the standards of academic integrity and professionalism in scholarly writing.

## IN-TEXT CITATIONS

In-text citations are essential components of academic writing that indicate when and where information from external sources has been incorporated into the text. This topic delves into the various aspects of in-text citations, including their purpose, placement, and formatting, across different citation styles such as MLA, APA, Chicago, Harvard, and Vancouver.

Many research studies have been introduced in the field of RREQ flooding attacks, which significantly concentrates on detection models that depend on the frequency of RREQ packets for sending the information [6]. In order to detect an attack, each node makes use of constant

*Fig.2 In-text citation – [6]*

1. Purpose of In-text Citations: In-text citations serve multiple purposes, including acknowledging the sources of information used in the text, providing credibility to the author's arguments, and enabling readers to locate the corresponding full citations in the bibliography or reference list.
2. Placement of In-text Citations: The placement of in-text citations varies depending on the citation style. In MLA and APA styles, in-text citations typically appear within parentheses at the end of a sentence or clause containing borrowed information. In contrast, Chicago and Harvard styles may use footnotes or endnotes for in-text citations.
3. Formatting of In-text Citations: Different citation styles employ distinct formatting conventions for in-text citations. For instance, APA style uses the author-date format, where the author's last name and the publication year are enclosed in parentheses, while MLA style uses the author-page format, where only the page number is included within parentheses.
4. Citing Multiple Authors: In-text citations must accurately reflect the number of authors for a given source. Depending on the citation style, this may involve listing all authors' names, using et al. for works with multiple authors, or citing the first author followed by "et al."
5. Citing Electronic Sources: With the proliferation of digital resources, in-text citations must also accommodate electronic sources such as websites, online articles, and digital documents. Citation styles provide guidelines for citing electronic sources within the text, often including URLs, DOIs, or website names.
6. Integration with the Text: In-text citations should seamlessly integrate with the surrounding text to maintain the flow and coherence of the writing. Authors must carefully choose the placement of citations to avoid disrupting the narrative or argumentation of their work.

7. Avoiding Plagiarism: Proper use of in-text citations is crucial for avoiding plagiarism, as failure to attribute borrowed information to its original source can lead to accusations of academic dishonesty. Authors must accurately cite all borrowed ideas, paraphrases, and direct quotations.

8. Consistency and Accuracy: Consistency and accuracy are paramount in the use of in-text citations. Authors should adhere to the specific guidelines of their chosen citation style to ensure that all citations are formatted consistently throughout the document.

By understanding the principles and conventions of in-text citations across different citation styles, authors can effectively integrate external sources into their writing while maintaining academic integrity and professionalism.

## REFERENCE

### LISTS/BIBLIOGRAPHIES

Reference lists or bibliographies are crucial components of academic writing that provide readers with complete information about the sources cited in a document. This topic explores the nuances of reference lists and bibliographies, including their purpose, formatting requirements, and differences across citation styles such as MLA, APA, Chicago, Harvard, and Vancouver.

1. Purpose of Reference Lists/Bibliographies: Reference lists and bibliographies serve the purpose of providing readers with a comprehensive list of sources cited in a document. They enable readers to locate and verify the sources referenced by the author, fostering transparency and credibility in academic writing.

2. Formatting Requirements: Each citation style has specific formatting requirements for reference lists or bibliographies. These requirements govern elements such as the arrangement of entries, punctuation, capitalization, and indentation. Understanding and adhering to these

formatting requirements is essential for creating accurate and professional-looking reference lists.

3. **Organization of Entries:** The organization of entries in reference lists or bibliographies varies depending on the citation style. Some styles, such as APA and Harvard, require entries to be alphabetized by the author's last name, while others, like MLA and Chicago, may use a chronological or numerical order.

4. **Elements of Citations:** Reference lists and bibliographies include various elements for each citation, such as author names, titles of sources, publication dates, and publication details (e.g., publisher, journal title, volume, and page numbers). Citation styles dictate the specific elements to include and their respective formatting.

5. **Citing Different Types of Sources:** Reference lists and bibliographies must accommodate different types of sources, including books, journal articles, websites, and multimedia materials. Citation styles provide guidelines for citing each type of source accurately and consistently.

6. **Electronic Sources:** With the rise of digital resources, reference lists and bibliographies must also include citations for electronic sources such as websites, online articles, and databases. Citation styles may provide specific formats for including URLs, DOIs, or database names in citations for electronic sources.

7. **Cross-referencing:** In some citation styles, authors may be required to cross-reference citations within the text to their corresponding entries in the reference list or bibliography. Cross-referencing ensures that readers can easily locate the full citations for sources cited in the text.

8. **Proofreading and Accuracy:** Authors should carefully proofread reference lists and bibliographies to ensure accuracy and consistency in formatting and citation details. Errors or inconsistencies in reference lists can undermine the credibility of the author's work and may

lead to misunderstandings or misinterpretations by readers.

By mastering the formatting requirements and conventions of reference lists and bibliographies in their chosen citation style, authors can enhance the clarity, professionalism, and integrity of their academic writing.

### **ELECTRONIC SOURCES IN CITATIONS**

Electronic sources, such as websites, online articles, e-books, and digital documents, have become increasingly prevalent in academic research and writing. This topic delves into the complexities of citing electronic sources within the context of different citation styles, including MLA, APA, Chicago, Harvard, and Vancouver.

1. **Types of Electronic Sources:** Electronic sources encompass a wide range of materials available online, including but not limited to websites, online articles, e-books, online journals, social media posts, blogs, and digital documents. Each type of electronic source may have unique citation requirements based on its format, publication medium, and accessibility.

2. **URLs vs. DOIs:** Citation styles may differ in their preference for citing electronic sources using URLs (Uniform Resource Locators) or DOIs (Digital Object Identifiers). Some styles, such as APA and Harvard, prioritize the use of DOIs for scholarly articles and other digital publications, while others, like MLA and Chicago, allow for the inclusion of URLs.

3. **Formatting URLs and DOIs:** When including URLs or DOIs in citations, authors must adhere to specific formatting guidelines dictated by the chosen citation style. This may involve presenting URLs as hyperlinks or using a specific format for DOIs, such as <https://doi.org/xxxxxx>.

4. **Access Dates:** In some citation styles, particularly APA and MLA, authors may be required to include the date on which

they accessed an electronic source. This is particularly important for sources that are subject to change or are not permanently archived, such as web pages.

5. Citing Social Media and Online Forums: Social media platforms, online forums, and other interactive online platforms pose unique challenges for citation. Citation styles may provide guidelines for citing tweets, Facebook posts, forum threads, and other user-generated content found online.

6. Archived and Offline Electronic Sources: Citation styles may also provide guidance on citing electronic sources that are archived or accessible offline, such as digital archives, databases, and downloadable documents. Authors may need to include information about the source's location, archive name, or database provider in these citations.

7. Digital Object Formats: Citation styles may offer specific guidance on citing digital object formats such as PDFs, e-books, audiobooks, and multimedia files. Authors may need to include information about the file format, digital platform, or distributor in these citations.

8. Accuracy and Reliability: When citing electronic sources, authors must assess the accuracy, credibility, and reliability of the information presented. Citation styles emphasize the importance of critically evaluating electronic sources and providing accurate citations to ensure the integrity of the research.

By understanding the nuances of citing electronic sources within the context of different citation styles, authors can effectively integrate digital materials into their research and writing while upholding the standards of academic integrity and professionalism.

### **APPLICATION AND USAGE OF CITATION STYLES IN ACADEMIC WRITING**

The application and usage of citation styles play a critical role in academic writing, as they ensure consistency, clarity, and

accuracy in attributing sources and supporting arguments. This topic explores the practical aspects of employing citation styles, including their relevance in different academic disciplines, conventions within specific fields, and strategies for effectively integrating citations into written works.

1. **Disciplinary Differences:** Different academic disciplines may have preferences for specific citation styles based on tradition, conventions, or the nature of the research. For example, humanities disciplines often favor MLA or Chicago styles, while social sciences and sciences may lean towards APA or Vancouver styles. Understanding disciplinary preferences is essential for aligning with scholarly norms and expectations.

2. **Publication Requirements:** Academic journals, publishers, and institutions may have specific guidelines or requirements for citation styles in submitted manuscripts or publications. Authors must carefully review and adhere to these guidelines to ensure compliance with publishing standards and increase the likelihood of acceptance or publication.

3. **Field-specific Conventions:** Within specific fields or sub-disciplines, there may be unique conventions or variations in citation practices. For instance, certain fields may prioritize citing primary sources or archival materials, while others may emphasize recent scholarly literature or empirical research. Familiarity with field-specific conventions enhances the relevance and credibility of citations within the context of disciplinary discourse.

4. **Adaptability and Versatility:** Proficiency in multiple citation styles enhances an author's adaptability and versatility in diverse academic contexts. Authors may need to employ different citation styles for various purposes, such as scholarly articles, research papers, theses, dissertations, conference presentations, or grant proposals. The ability to navigate



and apply different citation styles effectively expands an author's toolkit for scholarly communication.

5. Ethical Considerations: Proper citation practices uphold ethical standards by giving credit to the original creators of ideas, theories, or research findings. Plagiarism, the failure to acknowledge sources properly, is a serious ethical violation in academia that can have detrimental consequences for authors' reputations and academic integrity. Citation styles provide guidelines for avoiding plagiarism and maintaining ethical standards in research and writing.

6. Tools and Resources: Various citation management tools and resources are available to assist authors in generating citations, managing references, and formatting bibliographies according to specific citation styles. These tools, such as Zotero, Mendeley, EndNote, and citation generators provided by academic databases, streamline the citation process and help authors maintain consistency and accuracy in their citations.

7. Peer Review and Feedback: Peer review and feedback from colleagues, mentors, or academic advisors can provide valuable insights into the appropriateness and effectiveness of citation styles in written works. Authors should be open to constructive criticism and suggestions for improving citation practices to enhance the quality and impact of their scholarship.

By understanding the application and usage of citation styles in academic writing, authors can navigate disciplinary conventions, adhere to publishing standards, uphold ethical principles, and effectively communicate their research findings to scholarly audiences.

### CONCLUSION

Mastering citation styles is crucial for maintaining academic integrity, professionalism, and clarity in scholarly writing. Through adherence to style

guidelines, accurate in-text citations, meticulous reference list formatting, and consideration of electronic sources, authors can effectively attribute sources and support their arguments.

Understanding disciplinary conventions, publication requirements, and ethical considerations further enhances the relevance and credibility of citations. By embracing adaptability, utilizing tools and resources, and welcoming feedback, authors can navigate the complexities of citation styles with confidence. Ultimately, proficient citation practices contribute to the dissemination of knowledge, the advancement of research, and the integrity of academic discourse.

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## Personality Traits Affecting College Students' Adoption of Technology

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### ABSTRACT

*Changes in the educational system are just one area where COVID-19's technological innovations have been a boon. One of the many factors that impacts whether or not college students will adopt new technologies is the students' individual personalities. The research presented here aims to better understand how and why college students adopt new technology, as well as the role that five different personality traits play in this process. Three hundred thirty-two college students in the Indian state of Telangana were administered standard questionnaires based on two well-known models: the Technology Acceptance Model (TAM) and the Trait Individual Differences Inventory (TIDI). Convenience sampling was employed. Findings suggest that a variety of personality qualities, such as extroversion, openness to experience, emotional stability, conscientiousness, and agreeableness, influence how people respond to and make use of technological advances in the classroom. The demographic research showed that the rate of technology adoption among college students was unrelated to factors like gender and the geographic location of the student's family. Nonetheless, the demographic research showed that college students' adoption of technology was affected by factors including their major and family income. The students in fields other than the sciences, business, and the arts have the highest percentage of technology adoption. After a certain point, when students' monthly income had increased, they were more inclined to make use of the technology. The results may be helpful for future research as well as informing educational policy and programme development by people in positions of power.*

**Keywords:** Covid-19, students

### INTRODUCTION

The proliferation of the internet has significantly impacted society, with projections indicating that over 687 million Indians would be connected to the web by 2020. The majority of these users, around 629 million, access the internet through mobile devices, constituting approximately 12% of the global internet user population. This shift has empowered today's youth, who exhibit heightened comfort and proficiency in utilizing the

internet for diverse purposes such as personal development, learning, employment, and recreation.[1,2]

The COVID-19 pandemic has prompted widespread lockdown protocols across nations, restricting gatherings for political, religious, or educational purposes. This includes India, where such measures have been enforced to mitigate the spread of the virus. In response to this, numerous educational institutions have adopted

online teaching methods to address the educational needs of young individuals effectively.[3,4]

The phenomenon of online education has been the subject of extensive research since the beginning of the millennium, encompassing both desktop and mobile-based instructional formats. Scholars, including Kim et al. (2017), Briz-Ponce et al. (2017), Crompton and Burke (2018), Chavoshi (2018), and Hamidi (2019), have delved into various aspects of online learning.[5,6]

Given the evolving landscape of technology adoption, there is a growing interest in understanding how individual personality traits may influence one's openness to embracing cutting-edge technological advancements. Consequently, this study endeavors to investigate the correlation between diverse personality traits in young individuals and their utilization of digital tools for learning purposes.[7,8]

### RELATED WORK

The challenge of spreading new technologies has been the focus of a lot of studies. Despite its limitations, the technology acceptance model (TAM) has found widespread use in a wide range of fields (King, 2006; Chauhan and Jaiswal, 2016; umak, 2016; Cimperman *et al.*, 2016; umak *et al.*, 2017; Sánchez-Prieto *et al.*, 2016). King, (2006): Parasuraman produced another method in 2000 called the technology readiness index (T. R. I.). The optimistic, creative, uneasy, and insecure tendencies of individuals are all taken into account in the model as they relate to technological adoption.

There were many different models developed, but eventually one emerged that was comprehensive and widely adopted. The acronym "UTAUT" stands for "unified theory of acceptance and use

of technology," which is the name given to this framework (Venkatesh, 2003). The model took ideas and features from several different models and combined them into its own (Davis *et al.*, 1989; Venkatesh and Davis, 2000; Taylor and Todd, 1995; Vallerand, 1997; Thompson *et al.*, 1991; Compeau and Higgins, 1995).

The research here employs the U. T. A. U. T. model, with a few tweaks. Salarzadeh *et al.* (2017) discovered that performance expectancy and hedonic motivation were the two factors most associated with a learner's decision to use Facebook for e-learning. Social networking sites can be used as a teaching tool because they facilitate communication among users (Mazman 2010; Ainin *et al.*, 2015).

Terzis *et al.* (2012) used the Big Five Personality Trait Model to find out whether or not people were willing to use computer-based evaluation. Each of the five factors was found to influence the overall acceptance. The researcher has limited insight into student technology uptake in India and higher education or the influence of individual differences on this phenomenon. Even if everyone in the COVID-19 period is mandated to complete their education entirely online, this is still the case. The lack of prior research was the driving force behind the investigation.[9-16]

### METHODOLOGY

#### Research Objectives

Because not enough research has been done to see if there is a link between personality traits and using new technologies, the following goals have been set: 1. to look into the many different parts of students' personalities and how they use different kinds of technology. 2. To find out if there are any links between personality types and how much college students use new technologies. 3. To analyse the differences in the degree to

which different demographics of college students use various technologies, including gender, location, field of study, and family income.[17,18]

In this work, the TIPI scale established by Gosling and colleagues in 2003 is used to assess personality, while the U. T. A. U. T. model created by Venkatesh in the same year is used to assess technological adoption. It was in 2003 when both of these measures first saw the light of day. The U. T. A. U. T. model has been somewhat modified for use with college students in Telangana.

The survey instrument comprises a set of 16 questions, each designed to evaluate participants' responses through a Likert scale. This scale employs a rating system ranging from one to five points, with respondents indicating their level of agreement or disagreement. The Likert scale values are structured as follows: 1 denotes "strongly disagree," while 5 signifies "strongly agree." Participants are required to assign a numerical value to each question based on their personal agreement level, facilitating a quantitative assessment of their attitudes and opinions.

Ten questions make up the TIPI scale for character growth, and each is scored on a Likert scale from one to five. It measures five facets of personality: extroversion, agreeableness, conscientiousness, emotional stability, and receptivity to new experiences. A predetermined format

questionnaire was used to collect the information. A total of 400 questionnaires were sent out, with a response rate of 83% based on the 332 questionnaires deemed valid for the study. The collected information came from the Telangana area of the Indian state of Gujarat. The sampling method is a convenience sample.[19-22]

The SPSS statistical package was used for the majority of the data analysis. The techniques of descriptive analysis, correlation analysis, regression analysis, the t test, and the analysis of variance (ANOVA) have all been utilised here.[23]

## **ANALYSIS OF DATA AND DISCUSSION**

Various strategies for data analysis are employed, as mentioned below.

### **Descriptive Analysis**

If you want to know how trustworthy your data is, use Cronbach's alpha. This method currently produces reliable data with a 0.785 (Sun and Zang, 2006). Overall, we determined that the skewness was -0.039 with a standard error of 0.134 and that the kurtosis was -0.305 with a standard error of 0.267. Both of those numbers are analytical results. Research led to the conclusion that a significance level of 0.212 for the Shapiro-Wilk test is necessary to appropriately portray normal data and for the use of parametric tests. The consumer profile is shown in table 1.

*Table 1: Demographic profile of college students.*

<b>Gender groups</b>	
Male	195
Female	140
<b>Faculty of study</b>	
Arts	84
Commerce	86
Science	87
Others	85
<b>Geographic region</b>	
Urban.	170

Rural	170
<b>Family income</b>	
Less than 4,00,000	11
4,00,001 – 8,00,000	146
8,00,001 – 12,00,000	141
12,00,001 - 16,00,000	33
Above 16,00,000	11

**Correlation and Regression Analysis**

First, a Pearson correlation analysis is carried out with the purpose of establishing

a link between the use of technology by college students and five personal traits.

*Table 2: Pearson Correlation Analysis.*

		Extraversion	Agreeableness	Conscientiousness	Emotional stability	Openness to experience	Total tech adaption
Extraversion	Pearson Correlation	1	.628**	.495**	.367**	.562**	.650**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	330	330	330	330	330	330
Agreeableness	Pearson Correlation	.628**	1	.732**	.457**	.604**	.613**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	330	330	330	330	330	330
Conscientiousness	Pearson Correlation	.497**	.732**	1	.337**	.469**	.486**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	330	330	330	330	330	330
Emotional stability	Pearson Correlation	.367**	.457**	.337**	1	.686**	.432**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	330	330	330	330	330	330
Openness to experience	Pearson Correlation	.562**	.604**	.477**	.684**	1	.602**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	330	330	330	330	330	330
Total tech adaption	Pearson Correlation	.651**	.614**	.487**	.431**	.601**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	330	330	330	330	330	330

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Table 2 shows that there is a correlation between college students' adoption of technology and all five personality traits: extraversion, agreeableness,

conscientiousness, emotional stability, and openness to experience. The results of the regression analysis are noted and presented in tables 3, 4, and 5.

*Table 3: Regression analysis.*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.731 <sup>a</sup>	.531	.524	5.81738

**Predictors**

(Constant), openness to experience, conscientiousness, extraversion, emotional stability, agreeableness.

**Table 4: ANOVA for Regression analysis.**

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	12473.473	6	2513.387	73.418	.000 <sup>b</sup>
1 Residual	11026.802	327	34.942		
Total	23477.475	332			

- Dependent Variable: total tech adaption
- Predictors: (Constant), openness to experience, conscientiousness, extraversion, emotional stability, agreeableness.

**Table 5: Coefficients for Regression analysis.**

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	17.131	1.941		8.730	.000
1 extraversion	2.485	.371	.358	7.030	.000
1 agreeableness	1.241	.438	.201	3.031	.002
1 conscientiousness	.276	.382	.038	.701	.483
1 Emotional stability	.202	.344	.032	.584	.561
1 Openness to experience	1.544	.398	.236	3.897	.000

Dependent Variable: total tech adaption

The modified R2 was determined to be 0.525, and the value of F was discovered to be 74.218 after a regression analysis was performed. It appears from these findings that college students' use of technology is associated with all five personality traits: extroversion, agreeableness, conscientiousness, emotional stability, and openness to experience. Table 6 follows the same

format as tables 1-3 in presenting the coefficients.

**Analysis of Demographic Groups**

Table 5 shows the findings of the t-test for comparing the sexes and the one-way analysis of variance test for comparing the independent variables of age, education, and income.

Factors	Gender (t test).	Geographic region (t test).	Faculty of study (ANOVA).	Family income p. a. (ANOVA).
Passion for purchase online	-0.1047	-0.765	54.669*	97.902*

\* = significant at 0.05 significance level.

Results from a t test show that there are no statistically significant differences in the frequency with which males and females use different types of technology among college students. The analysis of variance shows that there are significant differences in the extent to which college students

adopt certain technologies based on their major and family wealth. A post hoc Tuckey test was run on the groups shown in Tables 7 and 8 to identify the statistically significant differences between them (faculty of study groups and family income groups, respectively).

**Table 6:** Multiple comparison for technology adoption by college students: Tuckey HSD for faculty of study groups.

(I) faculty	(J) faculty	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Arts.	Commerce.	-2.81921*	1.07301	.044	-5.5876	-.0502
	Science.	-9.41217*	1.07416	.000	-12.1885	-6.6369
	Others.	-12.17220*	1.08386	.000	-14.9649	-9.3608
Commerce.	Arts.	2.81737*	1.07104	.044	.0501	5.5856
	Science.	-6.59562*	1.06543	.000	-9.3473	-3.8454
	Others.	-9.34384*	1.07531	.000	-12.1209	-6.5680
Science.	Arts.	9.41219*	1.07615	.000	6.6378	12.1885
	Commerce.	6.59583*	1.06532	.000	3.8534	9.3453
	Others.	-2.75011	1.07953	.055	-5.5351	.0369
Others.	Arts.	12.16320*	1.08586	.000	9.3608	14.9649
	Commerce.	9.34413*	1.07551	.000	6.5671	12.1109
	Science.	2.74813	1.07953	.056	-.0358	5.5241

\*. The mean difference is significant at the 0.05 level.

**Table 7:** Multiple Comparisons for technology adoption by college students: Tuckey HSD for family income groups.

(I) income	(J) income	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Less than 4,00,000	4,00,001–8,00,000	-3.94852	1.97291	.268	-9.3604	1.4633
	8,00,001–12,00,000	-13.79731*	1.96793	.000	-19.1955	-8.3991
	12,00,001-16,00,000	-19.51612*	2.17043	.000	-25.4697	-13.5625
	Above 16,00,000	-26.00000*	2.78532	.000	-33.6403	-18.3597
4,00,001 – 8,00,000.	Less than 4,00,000	3.94852	1.97291	.268	-1.4633	9.3604
	8,00,001–12,00,000	-9.84876*	.68088	.000	-11.7165	-7.9811
	12,00,001 - 16,00,000	-15.56761*	1.14084	.000	-18.6970	-12.4382
	Above 16,00,000	-22.05146*	2.08535	.000	-27.7718	-16.3312
8,00,001 – 12,00,000.	Less than 4,00,000	13.79731*	1.96795	.000	8.3991	19.1955
	4,00,001 – 8,00,000	9.84878*	.68088	.000	7.9811	11.7165
	12,00,001 - 16,00,000	-5.71882*	1.13221	.000	-8.8246	-2.6131
	Above 16,00,000	-12.20270*	2.08066	.000	-17.9101	-6.4953
12,00,001 - 16,00,000.	Less than 4,00,000	19.51613*	2.17042	.000	13.5625	25.4697
	4,00,001 – 15.56760*	1.14084	.000	12.4382	18.6970	

	8,00,000.					
	8,00,001 – 12,00,000	5.71883*	1.13222	.000	2.6131	8.8246
	Above 16,00,000	-6.48387*	2.27312	.037	-12.7192	-.2486
Above 16,00,000	Less than 4,00,000	26.00000*	2.78531	.000	18.3597	33.6403
	4,00,001 – 8,00,000	22.05147*	2.08536	.000	16.3312	27.7718
	8,00,001 – 12,00,000	12.20270*	2.08066	.000	6.4953	17.9101
	12,00,001 – 16,00,000	6.48387*	2.27312	.037	.2486	12.7192

\*. The mean difference is significant at the 0.05 level.

The vast diversity in technology use among college students across disciplines is highlighted in the charts above. If we compare students' use of technology across different disciplines, we find that those in the arts and humanities are the most tech-savvy, followed by those in science and business. There was little difference in tech adoption between those in the lower income bracket (less than \$400,000 per year) and those in the middle-income bracket (\$400,000 to \$80,000 per year). However, there were notable differences in technology adoption between people whose annual income was between \$80,000.00 and \$160,000.00 and those whose income was more than \$160,000.00. When one considers the means, it becomes clear that more money means more technology being used by students in higher education.

## CONCLUSION

Personality traits such as extroversion, agreeableness, conscientiousness, emotional stability, and openness to new experiences all play a role in how quickly and easily college students adapt to new technology. Through regression analysis, college students' dependency on technology can be explained. College students' propensity to embrace new technologies was not significantly influenced by factors such as gender or location but was affected by the nature of

the students' majors and the socioeconomic status of their families. In the post-COVID-19 era, we are obligated to integrate technology into not only education but all facets of daily life. The findings can help individuals in decision-making positions in the education sector create policies and programs to increase college students' exposure to and comfort with technology. This discovery could lead to new avenues of investigation for the academic community in the future.

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# Age, Cars, and Claims: Decoding the Insurance Landscape

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## KEYWORDS:

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**ABSTRACT:** Embark on a journey through the realms of car insurance modeling, where the fusion of statistical and mathematical prowess unveils the secrets behind predicting claim frequency, severity, and overall costs. This enchanted exploration not only guides you through the wizardry of Python but also empowers you with the art of crafting insurance products, navigating risk, and orchestrating business strategies. If the arcane world of Car Insurance Modeling beckons you, join this mystical narrative, where algorithms and Python spells converge, weaving a tale of predictive mastery. Illuminate your path and delve into the enchantment of modeling automotive destinies with code as your guide.

## 1. INTRODUCTION

Welcome to the captivating world of Car Insurance Modeling, where the artistry of data meets the precision of prediction. Our journey begins with a singular aim: to craft a model that not only dances gracefully with the intricacies of insurance data but also waltzes through the challenges of minimizing prediction errors (Poufinas et al., 2023).

In this enchanting exploration, we navigate through a carefully orchestrated process:

### Unveiling Business Objectives

Delve into the heart of the business, unraveling its aspirations be it risk reduction, pricing optimization, enhanced competitiveness, or a harmonious blend of objectives.

### Data Collection Ballet

Elegantly collect data from internal archives, weaving together claims history and customer records, while pirouetting through external sources like public vehicle records and geographic information systems.

### Feature Choreography

Choreograph a symphony of new features, each a predictive note, from aggregating past claims to the graceful calculation of claim frequency and severity (Abdelhadi et al., 2020).

### Algorithmic Pas de Deux

Select from a repertoire of statistical and machine learning algorithms linear regression, generalized linear models, decision trees, or ensemble methods each step a dance to complement the unique characteristics of the problem.

## Alignment with Business Objectives

Ensure that our model pirouettes in perfect harmony with business objectives and gracefully respects risk thresholds.

To embark on this whimsical journey of Car Insurance Modeling, the first note requires a dataset inspired by the tales of insurance claims. Look no further, as I have uncovered an ideal dataset awaiting your exploration. Download the dataset: <https://statso.io/car-insurance-modelling-case-study/> (Staudt & Wagner, 2021).

## 2. DATASET OVERVIEW

The dataset at your fingertips unravels the stories of drivers and their vehicular adventures. Key variables include:

`age_of_driver`: The age of the driver.

`car_age`: The age of the car in years.

`region`: The geographical habitat of the driver (e.g., Urban, Rural, Suburban).

`number_of_claims`: The tally of claims made by the driver.

## 3. PYTHON-POWERED SYMPHONY OF CAR INSURANCE MODELING

To initiate this magical journey, let us set the stage by summoning the essential Python libraries.

```
# Essential Python Library Incantations
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import statsmodels.api as sm
from sklearn.model_selection import train_
```

This initial step is crucial for understanding the dataset's structure and content before delving into more advanced analyses or machine learning tasks.

```
# Loading the data from the CSV file
insurance_data = pd.read_csv("insurance_claims.csv")

# Displaying the first few rows of the dataset
print(insurance_data.head())
```

	age_of_driver	car_age	region	number_of_claims
0	30	7	Urban	0
1	33	10	Rural	2
2	39	11	Suburban	1
3	18	12	Urban	0
4	21	8	Urban	0

In this captivating journey of Car Insurance Modeling, our mission unfolds: to unravel the mystique of predicting the intricate dance of insurance claims frequency by drivers.

Now, let us embark on an odyssey through the statistical tapestry, where summary statistics reveal their secrets, and we unveil the enigma of missing values and delve into the

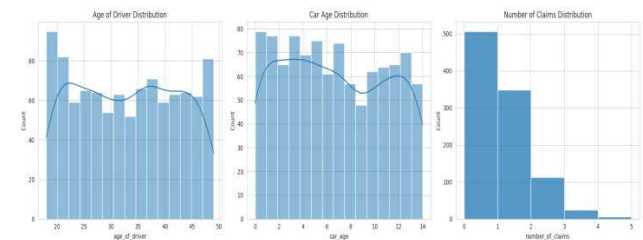
mesmerizing patterns of distribution analysis. Join us as we decipher the symphony of data, painting a vivid canvas of insights in the realm of predictive analytics for car insurance claims (Vassiljeva et al., 20217).

	age_of_driver	car_age	region	number_of_claims
count	1000.000000	1000.000000	1000	1000.000000
unique	NaN	NaN	3	NaN
top	NaN	NaN	Rural	NaN
freq	NaN	NaN	343	NaN
mean	33.112000	6.673000	NaN	0.675000
std	9.253598	4.377583	NaN	0.822223
min	18.000000	0.000000	NaN	0.000000
25%	25.000000	3.000000	NaN	0.000000
50%	33.000000	6.000000	NaN	0.000000
75%	41.000000	11.000000	NaN	1.000000
max	49.000000	14.000000	NaN	5.000000

```
print(missing_values)

age_of_driver      0
car_age            0
region             0
number_of_claims  0
dtype: int64
```

Now, let us dive into the visual realm, where data transforms into art. We will paint vivid pictures of distributions and dance through categorical nuances, crafting an insightful narrative. Join us in this short but vibrant act, where each plot reveals a chapter in the saga of analytical discovery (Guelman, 2012).



**Figure 1:** Journey through the Data.

Journey through the data whispers reveals captivating insights as given in Figure 1:

### Age of Driver

The age ballet unfolds, gracefully pirouetting around the 30s, casting a serene aura of a nearly normal distribution.

### Car Age

In the symphony of car ages, an enchanting dance takes shape, adorned with the elegance of normality, albeit with a subtle rightward tilt, as if the cars are waltzing through time.

### Number of Claims

A narrative of claims unfolds, and in this count data saga, most drivers gracefully hold a count of 0, crafting a right-

skewed tale, a familiar melody in the ballad of insurance claims.

#### 4. DATA PREPROCESSING

The 'region' variable, a categorical gem in our dataset, is about to undergo a transformation, transitioning gracefully into a numerical format fit for the modeling stage. Behold the magic of one-hot encoding, a well-practiced incantation in our data sorcery. As the preprocessing curtains end, the spotlight shifts to the grand stage of GLM modeling. Poisson or Negative Binomial, the stars that illuminate the modeling sky for count data, shall guide our journey into the enchanting world of insurance claims.

	age_of_driver	car_age	number_of_claims	region_Suburban	region_Urban
29	26	13	1	0	0
535	42	9	2	1	0
695	44	8	1	0	0
557	41	3	1	1	0
836	31	12	0	0	1

The 'region' variable has undergone a magical transformation through the alchemy of one-hot encoding, giving rise to two new enchanting variables: region\_Suburban and region\_Urban, with the humble region\_Rural gracefully holding the baseline, unseen but powerful. Our dataset, now bedecked in its new attire, is ready for the grand spectacle of modeling.

The curtain rises on a divided stage, with the dataset gracefully split into training (80%) and testing (20%) enclaves. A harmonious blend of preparation and anticipation sets the scene for the forthcoming act, where the models will dance and weave their predictive wonders. The stage is set, and the saga of modeling awaits its grand unveiling.

#### 5. CAR INSURANCE MODELING FOR EVENT FREQUENCY

In the enchanting realm of event frequency modeling, where the dance of count data reigns supreme, two distinguished partners take the stage: Poisson and Negative Binomial regression. Their choice is an artful decision, a dance of variance, and count data's unique rhythm.

Poisson Regression, a gallant partner, steps forth with grace, assuming equilibrium in mean and variance ideal for count data not veiled in overdispersion. Yet, the stage is vast, and Negative Binomial Regression, a flexible virtuoso, awaits, ready to harmonize with count data boasting a variance greater than its mean.

Our journey unfolds with the Poisson Regression's debut, a poised exploration into fit and diagnostics. Should the need arise, the symphony may transition to the echoes of Negative Binomial Regression's melody.

As the curtain rises, we usher in the act of building the Poisson GLM model. 'age\_of\_driver,' 'car\_age,' 'region\_Suburban,' and 'region\_Urban' don their predictive attire, casting spells upon 'number\_of\_claims,' our revered response variable. The stage is set for predictive poetry to unfold.

Generalized Linear Model Regression Results						
<b>Dep. Variable:</b>	number_of_claims	<b>No. Observations:</b>	800			
<b>Model:</b>	GLM	<b>Df Residuals:</b>	795			
<b>Model Family:</b>	Poisson	<b>Df Model:</b>	4			
<b>Link Function:</b>	Log	<b>Scale:</b>	1.0000			
<b>Method:</b>	IRLS	<b>Log-Likelihood:</b>	-845.44			
<b>Date:</b>	Wed, 10 Jan 2024	<b>Deviance:</b>	829.41			
<b>Time:</b>	14:26:01	<b>Pearson chi2:</b>	770.			
<b>No. Iterations:</b>	5	<b>Pseudo R-squ. (CS):</b>	0.02749			
<b>Covariance Type:</b> nonrobust						
	<b>coef</b>	<b>std err</b>	<b>z</b>	<b>P&gt; z </b>	<b>[0.025</b>	<b>0.975]</b>
<b>const</b>	0.0906	0.181	0.502	0.616	-0.263	0.444
<b>age_of_driver</b>	-0.0205	0.005	-4.321	0.000	-0.030	-0.011
<b>car_age</b>	0.0152	0.010	1.539	0.124	-0.004	0.035
<b>region_Suburban</b>	0.0799	0.106	0.755	0.450	-0.127	0.287
<b>region_Urban</b>	0.0861	0.108	0.794	0.427	-0.126	0.298

The Poisson GLM's Revelations:

Const (Intercept):

The enigmatic const unfolds as the intercept, with an estimate of 0.0906. Alas, it does not hold the scepter of statistical significance, its p-value (0.616) rendering it but a mere spectator.

Age\_of\_Driver:

A captivating tale unfolds as the age\_of\_driver takes the stage. The coefficient, a mysterious 0.0205, whispers secrets of a logarithmic decrease in expected claims with each passing year. It wears the cloak of statistical significance (p-value < 0.001), weaving a compelling narrative of age and claims intertwined.

Car\_Age:

The spotlight shifts to car\_age, with a coefficient of 0.0152. A subtle suggestion emerges older cars may harbor slightly higher expected claims. Yet, the jury of statistics remains indecisive (p-value: 0.124), leaving the effect cloaked in uncertainty.

Region\_Suburban and Region\_Urban:

In the urban and suburban ballad, coefficients 0.0799 and 0.0861 echo, hinting at higher expected claims compared to the rural baseline. Alas, the grand stage of statistics remains unswayed (p-values: 0.450 and 0.427), and the urban and suburban whispers dissipate into the statistical abyss.

## 6. CONCLUSION

In the enchanted realm of car insurance modeling, the symphony of statistical and mathematical elegance unfolds. Here, the artistry lies in predicting the rhythmic cadence of events the dance of claim frequencies, the nuanced whispers of claim severity, and the grand tapestry of total costs entwined with each claim's narrative. This harmonious prediction not only adorns the canvas of insurance pricing but also orchestrates a ballet of risk management and strategic optimization. In the delicate dance of algorithms and numbers, car insurance modeling emerges as a maestro, conducting a predictive symphony that resonates through the corridors of risk and strategy, shaping the future of insurance landscapes. The model, a sage in its revelations, paints a portrait: Age, the maestro, orchestrates a symphony of decreased claims with time. Car age whispers a subtle tune of higher claims, but the audience of statistics remains contemplative. The urban and suburban regions, though filled with tales, fail to sway the statistical verdict no significant impact on the claims compared to the rural serenity. The Poisson GLM, a poet of predictions, leaves us to ponder the intricacies of age, cars, and the vast landscapes of region.

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## From Chaos to Clarity: Building a Python Data ETL Pipeline

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### ABSTRACT

*This paper explores the significance of Data ETL pipeline development as a highly valuable skill for Data Engineers. Data ETL encompasses the extraction, transformation, and loading of data from a source into a database. By focusing on the development of a Data ETL pipeline using Python, this article provides a comprehensive guide for those seeking to acquire expertise in this area.*

**Keywords:** Python, Python, ETL.

### INTRODUCTION

Data Engineering plays a critical role in the world of data-driven decision-making. Among the many essential skills for Data Engineers, developing Data ETL (Extract, Transform, Load) pipelines stands out as one of the most valuable.

ETL is a process that involves extracting data from various sources, transforming it according to specific requirements, and loading it into a database for further analysis and utilization.

This article aims to provide an overview of Data ETL pipeline development, with a particular focus on utilizing the Python

programming language. Whether you are an aspiring Data Engineer or a seasoned professional looking to enhance your skills, this article will guide you through the process of developing a robust and efficient Data ETL pipeline.

### Data ETL Pipeline using Python

To create a Python-based Data ETL pipeline, the initial stage involves gathering data from a data source. In this case, we will utilize the Fashion-MNIST dataset offered by the Keras library, making it suitable for beginners.

Prior to proceeding, it is essential to examine the data's structure.

```
import tensorflow.keras as keras
(xtrain, ytrain), (xtest, ytest) = keras.datasets.fashion_mnist.load_data()
```

```
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/train-labels-idx1-ubyte.gz
29515/29515 [=====] - 0s 0us/step
```

```
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/train-images-idx3-ubyte.gz
26421880/26421880 [=====] - 0s 0us/step
```

```
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/t10k-labels-idx1-ubyte.gz
5148/5148 [=====] - 0s 0us/step
```

```
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/t10k-images-idx3-ubyte.gz
4422102/4422102 [=====] - 0s 0us/step
```

```
print(xtrain.shape)
print(ytrain.shape)
print(xtest.shape)
print(ytest.shape)
```

```
(60000, 28, 28)
(60000,)
(10000, 28, 28)
(10000,)
```

Next, we proceed to clean and modify the data. Our objective is to normalize the pixel values, ensuring they fall within the

range of 0 to 1. Additionally, we reshape the data into a 4D tensor for further processing:

```
import numpy as np

xtrain = xtrain.astype('float32') / 255
xtest = xtest.astype('float32') / 255

xtrain = np.reshape(xtrain, (xtrain.shape[0], 28, 28, 1))
xtest = np.reshape(xtest, (xtest.shape[0], 28, 28, 1))

print(xtrain.shape)
print(ytrain.shape)
print(xtest.shape)
```

```
(60000, 28, 28, 1)
(60000,)
(10000, 28, 28, 1)
```

Next, we'll proceed with loading the data into a database. To accomplish this, we'll employ SQLite, enabling us to create a

database and subsequently load the data into it.



```
import sqlite3

conn = sqlite3.connect('fashion_mnist.db')

conn.execute('''CREATE TABLE IF NOT EXISTS images
              (id INTEGER PRIMARY KEY AUTOINCREMENT,
              image BLOB NOT NULL,
              label INTEGER NOT NULL);''')

for i in range(xtrain.shape[0]):
    conn.execute('INSERT INTO images (image, label) VALUES (?, ?)',
                 [sqlite3.Binary(xtrain[i]), ytrain[i]])

conn.commit()

for i in range(xtest.shape[0]):
    conn.execute('INSERT INTO images (image, label) VALUES (?, ?)',
                 [sqlite3.Binary(xtest[i]), ytest[i]])

conn.commit()

conn.close()
```

In the provided code:

- I. The initial line imports the sqlite3 library, enabling the utilization of SQLite databases in Python.
- II. A connection to the database is established.
- III. Subsequently, a table named "images" is created within the database.
- IV. A loop is implemented to iterate through each image in the training data and insert it into the "images" table, including the corresponding labels.
- V. The commit() method is employed to save the modifications made to the database.
- VI. Another loop is utilized to iterate through each image in the test data and insert it into the "images" table, along with the labels.
- VII. The commit() method is used once again to save the alterations to the database.
- VIII. Finally, the connection to the database is closed.

This illustrates the creation of a Python-based Data ETL (Extract, Transform, Load) pipeline. The pipeline processes the Fashion MNIST dataset and stores it within an SQLite database, ensuring convenient access and manipulation of the data at a later stage.

Now, let's explore how you can read the data stored in the SQLite database:

```
import sqlite3
conn = sqlite3.connect('fashion_mnist.db')
cursor = conn.cursor()

cursor.execute('SELECT * FROM images')
rows = cursor.fetchall()

import pandas as pd
data = pd.read_sql_query('SELECT * FROM images', conn)
```

### Conclusion

The process of Data ETL involves extracting data from a source, applying transformations to the data, and loading it into a database. ETL stands for Extract, Transform, and Load, representing the key stages of this process. I trust you found this article informative and enjoyable, providing insights into the development of a Data ETL pipeline using Python.

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