The Title of this Paper

Name1
Roll No.
Branch, NITH

Name2
Roll No.
Branch, NITH

Name3
Roll No.
Branch, NITH

Name4
Roll No.
Branch, NITH

***Abstract*—An abstract summarizes, usually in one paragraph of 300 words or less, the major aspects of the entire paper in a prescribed sequence that includes: 1) the overall purpose of the study and the research problem(s) you investigated; 2) the basic design of the study; 3) major findings or trends found as a result of your analysis; and, 4) a brief summary of your interpretations and conclusions.**

***Index Terms*—Keyword1, Keyword2, Keyword3, Keyword4, Keyword5**

I. Introduction

A. Background and Motivation

THIS section deals with the backgroud and motivation behind the problem statement, this is also the section where we can give a general introduction as to why this problem statement has been chosen as a part of our research. We can describe the possible details of the problem, its characteristics and an overview of the existing solutions that are there.

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B. Our Contribution

This section describes the contributions of this paper in terms of improvement over the existing solutions as well as clear one-line description of what this paper is achieves so as to ensure that the reader doesn't waste much time trying to understand our research.

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The main contributions of this paper are as follows:

- This is **contribution1** of this research
- This is **contribution2** of this research
- This is **contribution3** of this research

C. Paper Organization

This section describes the layout of the research paper with different sections and their details. It is basically written to act as a contents sections of the research paper for ease with navigation.

The rest of this paper is organized as follows. Section II introduces the previous work for ____. Section III introduces the system model used in this study and the problem statement for ____. In Section IV, we present our theoretical results. We first prove ____ in Section IV-A and then present a ____ in Section IV-B. Finally we provide simulation results in Section V and conclude the paper with future research discussion in Section VI.

II. Related Work

In this section we give of our literature survey which is nothing but a summary of related research works that we studied in order to propose a solution to our problem statement. This section is about stating the findings as well as limitations of the other research work related to our topic.

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aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum. [3]

III. Problem Formulation

This section is all about mathematically formulating the problem so that it can be described through functions and can be solved via equations or proofs which leads to a formal and logical description of the proposed solution and can be universally understood.

Random Problem Formulation Example :

The travelling salesman problem (TSP) asks the following question: Given a list of cities and the distances between each pair of cities, what is the shortest possible route that visits each city exactly once and returns to the origin city? It is an NP-hard problem in combinatorial optimization, important in operations research and theoretical computer science.

TSP can be formulated as an integer linear program. Label the cities with the numbers $0, ...,$n and define:

$$x_{ij} = \left\{ \begin{array}{ll} 1, & \text{the path goes from city } i \text{ to city } j, \\ 0, & \text{otherwise} \end{array} \right\} \quad (1)$$

For $i = 1, ..., n$, let u_i be an artificial variable, and finally take c_{ij} to be the distance from city i to city j. Then TSP can be written as the following integer linear programming problem:

$$\min \sum_{i=0}^{n} \sum_{j \neq i, j=0}^{n} c_{ij} x_{ij} \quad (2)$$

$$0 \leq x_{ij} \leq 1 \qquad i, j = 0, \cdots, n \quad (3)$$

$$u_i \in \mathbf{Z} \qquad i = 0, \cdots, n \quad (4)$$

$$\sum_{i=0, i \neq j}^{n} x_{ij} = 1 \qquad j = 0, \cdots, n \quad (5)$$

$$\sum_{j=0, j \neq i}^{n} x_{ij} = 1 \qquad i = 0, \cdots, n \quad (6)$$

$$u_i - u_j + n x_{ij} \leq n - 1 \qquad 1 \leq i \neq j \leq n \quad (7)$$

The first set of equalities requires that each city be arrived at from exactly one other city, and the second set of equalities requires that from each city there is a departure to exactly one other city. The last constraints enforce that there is only a single tour covering all cities, and not two or more disjointed tours that only collectively cover all cities. To prove this, it is shown below (1) that every feasible solution contains only one closed sequence of cities, and (2) that for every single tour covering all cities, there are values for the dummy variables u_i that satisfy the constraints.

To prove that every feasible solution contains only one closed sequence of cities, it suffices to show that every subtour in a feasible solution passes through city 0 (noting that the equalities ensure there can only be one such tour). For if we sum all the inequalities corresponding to $x_{ij} = 1$ for any subtour of k steps not passing through city 0, we obtain:

$$nk \leq (n-1)k,$$

which is a contradiction.

It now must be shown that for every single tour covering all cities, there are values for the dummy variables u_i that satisfy the constraints.
Without loss of generality, define the tour as originating (and ending) at city 0. Choose $u_i = t$ if city i is visited in step t $(i, t = 1, 2, ..., n)$. Then

$$u_i - u_j \leq n - 1,$$

since u_i can be no greater than n and u_j can be no less than 1; hence the constraints are satisfied whenever $x_{ij} = 0$. For $x_{ij} = 1$, we have

$$u_i - u_j + n x_{ij} = (t) - (t+1) + n = n - 1,$$

satisfying the constraint.

IV. Theoretical Results

This section describes the theorems, lemmas and algorithms used in the proposed solution. It can have the in depth description of the theorems and lemmas used along with their algoritmic implmentation. This makes the research foundation solid and much easily understood. These theorems must have an easy to find bifurcation for the user to see.

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Theorem 1 [4] *lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.*

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Theorem 2 *lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.*

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Lemma 1 [5] *lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.*

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Lemma 2 *lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.*

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V. Simulation

This section describes the simulations of our proposed solution along with it's theoretical as well as practical analysis, one can also add a comparison with the existing solutions which gives a strong base to the research. Before stating the simulation results we need to clearly mention the assumptions taken while simulating the results.

1) This is our *assumption1*
2) This is our *assumption2*
3) This is our *assumption3*

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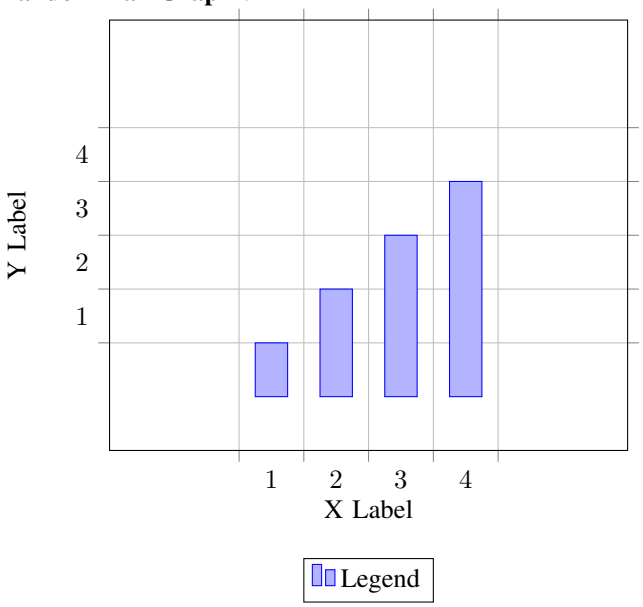
Random Table Reference Example I :

Column1	Column2	Column3	Column4	Column5
1	value12	value13	value14	value15
2	value22	value23	value24	value25
3	value32	value33	value34	value35
4	value42	value43	value44	value45
5	value52	value53	value54	value55

TABLE I
TITLE OF TABLE

Random Bar Graph :



Random Code Sample :

```
if __name__ == "__main__":
""" This is the main function """

    print("Hello World")
main()
```

VI. Conclusion

This is the last section of our research paper that contains the conclusions and inferences based on the previous section of simulations. It also describes the overall paper like the abstract with a little more statistical insight to the results and the prominent results achieved through this paper. One can also mention a few limitations that this research couldn't consider and a mention of future implementation plans (if any).

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Acknowledgment

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References

[1] K. Saxena, "Nith-template for any research paper," *NITH-Template repository for templates based on NITH*, vol. 1, no. 1, pp. 1–5, 2020.
[2] K. Saxena, "Nith-template for any research paper," *NITH-Template repository for templates based on NITH*, vol. 1, no. 1, pp. 1–5, 2020.
[3] K. Saxena, "Nith-template for any research paper," *NITH-Template repository for templates based on NITH*, vol. 1, no. 1, pp. 1–5, 2020.
[4] K. Saxena, "Nith-template for any research paper," *NITH-Template repository for templates based on NITH*, vol. 1, no. 1, pp. 1–5, 2020.
[5] K. Saxena, "Nith-template for any research paper," *NITH-Template repository for templates based on NITH*, vol. 1, no. 1, pp. 1–5, 2020.