GOVERNMENT DEGREE COLLEGE NARAYANKHED, DISTRICT SANGAREDDY AFFILIATED TO OSMANIA UNIVERSITY (ISO 9001:2015 Certified)



DEPARTEMNT OF MATHEMATICS JIGNASA-2021 STUDENT STUDY PROJECT

TITLE: APPLICATION OF LINEAR ALGEBRA IN REAL LIFE

SUBMITTED BY

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Introduction:

> The origin and development of Linear Algebras directly related to the solution of the systems of linear equations.

> Thus the concepts of linear algebra are clearly understood, if we have a good knowledge and understanding of the systems of linear equations.

>In the present age of knowledge explosion, there is a highly demanding need for analyzing and the solving the available big data.

> Linear algebra is one of the key subjects which help in large scale computations. A basic knowledge, understanding and mastery of linear algebra provide a foundation for further work in many interesting areas.

Aims and objectives:

>The motivation for this concepts comes mainly from the purpose to understand the complexity of mathematical problems in linear algebra.

>Many tasks of linear algebra are recognized usually as elementary problems, but the precise complexity of them was not known for a long time ago.

> The aims are of this concepts is to understand the eigenvalues and eigenvectors and to go through some of their applications in the mathematical and engineering areas in order to show their importance and impact.

Research Methodology-Project Method:

Providing a situation: Lecturer must provide the situation to the students which may arose curiosity. Student must felt its must important situation to research on it

Choosing and purposing: Lecturer can give number of projects but selection is done by the students. Lecturer can only be a guide

Planning of project: Student have to plan with the guidance of the lecturer to carry out the project

Executing the project: In this step the lecturer helps students in assigning work according to there need, interest capability..... etc. Each member must actively involved in Executing project.

Judging the project: The student along with the lecturer must review the progress of the project.

Analysis of Data:

What is linear Algebra?

A branch of mathematics that is concerned with mathematical structured closed under the operation of addition and scalar multiplication and that includes the theory of system of linear equations, matrices, determinates, vector spaces, and linear transformation

Applications of linear algebra in a real life:

Electrical circuits
Variable costs
Traffic flow
Chemical mixing

Electrical circuits:

•Electrical circuit is nothing but just a combination of capacitor, transistoretc •An electrical circuit is a path in which electrons from a voltage or current sources flow

Linear Algebra in Electrical circuits:

Linear algebra most apparently uses by electrical engineers when there is system of linear algebra arises the concepts of linear algebra various electrical circuits solution like Kirchhoff's law, ohms law, are conceptually arise linear algebra. To solve various linear equations we need to introduce the concept of linear algebra.

Variable cost:

Variable cost are expenses that fluctuate proportionality with the quantity of output

How linear algebra is used in variable cost:

Imagine that you are taking a taxi while on vacation you know that taxi service charges 9 dollar to pick your family up from your hotel and another 0.15doller per mile for the trip without knowing how many miles it will be to each destination, you can set up a linear equation that can be used to linear find the cost of any taxi trip you take on your trip.By using X to represent the number of miles to your destination and Y to represent the cost of that taxi ride ,the linear equation would be

Y=0.15X+9

How linear algebra used is traffic flow:



Here we have a diagram that shows small network of street.

All the street Organize a street and direction of traffic indicated by this arrow. Four reference it will be useful to give names of this street four we Call them A, B, C&D .

Now, one of the basic problem the traffic engineer space is to find flow rate of car in each street Naturally the most direct way of finding flow of traffic is simply go on a street and count the car, lets assume, we count the behavior of few street and record data

On the every there are 85 car per/hour passing through street A. There are 70 car per hour passing through street intersection of C and D.45 cars per hour passing through the intersection of B and D.

In the same way we can find flow of traffic of the remaining street but in practice especially when we are dealing in large network of street it is time consuming so we need a lot of Margery equipment. For it is more efficient if it is based on partial data that we have. We could some how compute traffic flow of some other street we let the traffic flow in remaining street of $x_1, x_2, x_3, x_4 \& X_5$.

Now our compotation based on basic observation the first of the observation is flow into an intersection must be equal to flow out of that intersection the second observation is total flow of in must be equal to total flow out.



Total	85+X ₄ =120+X ₅
A	85=X ₁ +X ₂
B	$X_1 + X_3 + 45 = 120$
C	$X_2 + X_4 = 70 + X_3$
D	$70 = 45 + X_5$
X ₄ -X ₅ =35	X ₁ =75-X ₃
X ₁ +X ₂ =85	X ₂ =10+X ₃
X ₁ +X ₃ =75	X ₃ =FREE VARIABLE(X ₃)
X ₂ -X ₃ +X ₄ =70	X ₄ =60
X ₅ =25	X ₅ =25



Note: $R_2 - R_1$, $R_4 - R_2$, $R_4 - R_3$, $R_5 - R_4$, $R_3 + R_4$

So from linear algebra we can find the flow of traffic in the intersection of street. *The next application We use this observation to set up some equation and this equation would be our general form, Whatever gets in must be equal whatever gets out, Let's apply first, total flow of traffic in and out of the network, In our network we have 2 streets leading into the network that is A & C. There are 2 streets that traffic lead the network i.e. B&D.now we have flow of traffic from Individual Street. From street A, there are 85 cars per hour enter,& from street C, there are x_4 From street B, there are 120 cars per/hour leaving From street D, there are x_5 .

So, total cars in from this networks is $85+x_4$ and total cars that are out from this network must be equal to $120+x_5$, Now we calculate this amount of flow of traffic from individual street i.e. A, B & C, and we have this equations. Now we convert the equation into system of equations, from this system we obtain our matrix and from row deduction we obtain another matrix ,in this matrix most of the elements are '0'(zero) this is called sparts matrix which are rear occurs in real lives, from this matrixes we obtain the remaining traffic value of street i.e. $x_1, x_2, x_3, x_4 \& x_5$. quantity of out put of linear algebra rad life is variable cost. First we discuss what is variable cost :variable cost are expenses the

fluctuate Proportionality with the.

Finding:

>Application of linear algebra used in controlling the traffics and electrical circuits

>Application of linear algebra used in variable costs and chemical mixing

Conclusions & suggestions:

>There is a vast scope of using Application linear algebra in our real life problems

>Application of linear algebra is used in controlling the traffics

>Application of linear algebra play a prominent role for deriving the formula in physics, chemistry, etc. subjects

>If provide all facility we can improve your knowledge and investigation research work will progress instantly

Reference:

Gilbert strang, Linear algebra han H.Friedberg, Arnold J.Insel, Lawrence, E.Spence Linear algebra
 Kuldeepsing;Linear algebra

Sheldon Axler; Algebra Done Right

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