Using Markov Model to Study the Behavioral Pattern of Students in Nigeria Tertiary Institutions towards their Studies Based on Age, Attendance and Cummulative Grade Point Average. (A Case Study of Ken Poly)

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Abstract
Students' unpredicted behaviors towards their studies have been a source of concern to both government and authorities of tertiary institutions in Nigeria. This research seeks to find out a definite pattern of students' behaviors towards their studies based on age, attendance and CGPA. The research showed that age is a major factor in the behavioral pattern of students in Nigerian tertiary institutions and age affects attendance and CGPA. The research also showed that students below 25years had less attendance and CGPA less than 3.00 while those that are 25years and above had over 75% attendance and CGPA above 3.00.

INTRODUCTION

The research "using Markov Model (Chain) to study the behavioral pattern of students in Nigeria tertiary institutions (a case study of Kenpoly)" talks about how human behavior is been affected by the day to day activities especially in tertiary institutions.

However, it is worthy to note that the behavioral pattern of humans are unpredictable and cannot be quantified, thus, the researcher decided to carry out an analysis and draw valuable conclusion from it. Though various authors have propounded about the behavioral pattern of humans but in this research, the researcher will analyze the behavioral pattern as a device and interpret it in other to produce reasonable information.

Nevertheless, the data for this research work will be unbiased and accurately obtained in other to ensure that the result will be very accurate and valuable for inference.

The application of the Markov Model in studying human behavior can be accurately described as a set of dynamic models. The approach to modeling human behavior is to consider the human as a device with a large number of internal mental states.

This model was developed a long time ago to help in dealing with medical issues, weather, business comparing, human behavior etc.

However, considering the views of some human behavior experts, Grafen (1984) stipulated that "human behavioral ecologist appeal to the phonologic gambit which allows researchers to test the prediction that behavior is fitness optimizing in the environment under study without recourse to understanding the mechanism involved. According to Napoleon Chagnon (1990)

"human behavior is one thing that cannot be quantified with anything because its existence started since when humans where created". In 1970 one of the key concepts within this field is that the human behavior is extremely flexible and adaptive.

Richard Alexander (et al) (1992) explained human behavior based on the assumption that "individuals behave in a manner that maximizes their reproductive success with particular emphasis on foraging and reproductive behavior". Furthermore, since psycho-analysis seeks to explain how the human mind works, it contributes into whatever the human mind produces. Sigmund feud (1973) which was the first psycho-analyst said that "when it comes to behavioral pattern or human behavior our addition for analysis often results in an abandonment of common sense i.e. analyzing human behavior instead of accepting it for what it is". Strength of this approach is that it typically tries to explain concrete human behavior in real world environment.

R.A. Foley (1991) stipulated that "as origin of human behavior results from the four and a half days at the congress of discussions of pre circulated papers and verbal contributions presented" organized by Prof. Michael Day (et al). Prof. Kainz (2007) in his book "philosophy of man" quotes that "human nature builds up very nicely, step by step to what is no doubt the most intriguing and haunting question about human nature" while Murray (1938) state that "behavioral pattern are motivated by needs".

DEFINITION OF TERMS

HUMAN BEHAVIOR: It refers to the way of every physical action and observable emotion associated with individuals as well as the human race as a whole.

MARKOV MODEL: It consists of a list of the possible states of that system, the possible transition paths between those states and the parameters of those transitions.

TREE DIAGRAM: It is a diagram with lines that divide more and more as you move to lower levels to show the relationship between processes, people etc.

MODEL: A simple description of a system used for explaining how something works or calculating what might happen.

METHODOLOGY

In every research work it is always customary to gather information that will assist or enable the researcher to analyze the data in regard of the aims and objectives of the research work at hand and possibly understand the behavioral pattern of humans.

MARKOV MODEL

It is a model that consists of a list of the possible states of any given system. Based on various data screening, hypotheses are often used because they reduce the statistical influence burden.

Andrie Adreevich Markov who was born in June 2, 1856 in Ryazan, Russia invented, the model of which he named after himself and one of which include the Markov chains.

MARKOV CHAINS

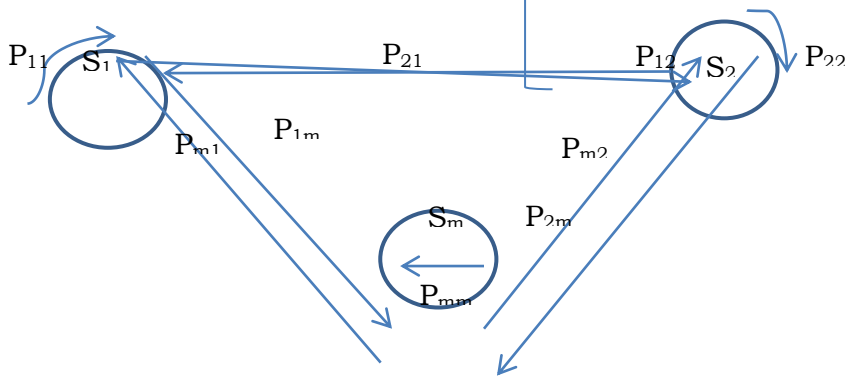
In 1905, the Markov chain tem from one state to another was developed where each event depends only on its immediate preceding event rather than other proceeding events. To predict the movement of the system from one state to the next state, it is necessary to know the conditional or transitional probabilities which are element of a square matrix or transition diagram.

$P = [P_{ij}]_{mxm} =$

Succeeding state

Initial state		S_1	S_2	S_m
	S_1	P_{11}	P_{12} . . . . . P_{1m}	
	S_2	P_{21}	P_{22}. . . . . P_{2m}	
	S_m	P_{m1}	P_{m2}. . . . . P_{mm}	

Assuming all transitions occur



Probability Tree Diagram

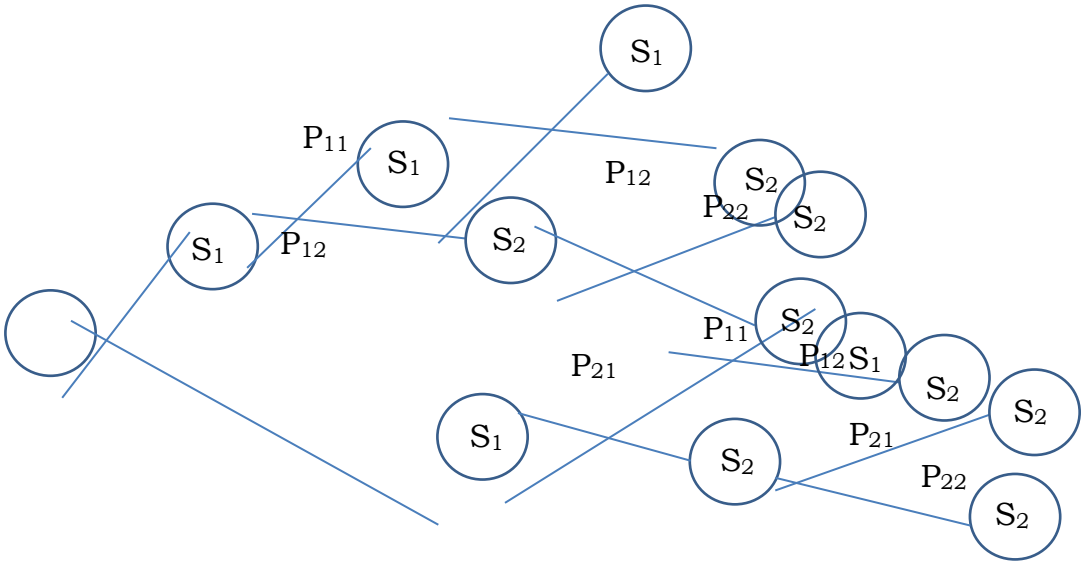
The probability tree diagram is used to illustrate only a limited number of transactions.

For Example

$P = [P_{ij}]_{2\,x\,2} =$

State 1 S_1

	P_1	P_2
S_{21}	P_{21}	P_{22}



DATA PRESENTATION/ANALYSIS

Let RA be Reading alone
RG be Reading in group
CM be Cramming
ST be sorting
MC be Micro chip

DEPT.	**AGE**	**ATTENDANCE**	**CGPA**	**COMMON BEHAVIOR**
Computer	<25 = 9	< 75% = 12	< 3.0 = 14	RA = 3
	≥25 = 11	≥75% = 8	≥3.0 = 6	RG = 5
				CM = 9
				ST = 2
				MC = 1
Statistics	< 25 = 12	< 75% = 14	< 3.0 = 7	RA = 4
	≥25 = 8	≥75% = 6	≥ 3.0 = 13	RG = 8
				CM = 3
				ST = 1
				MC = 4
Science Laboratory Technology	< 25 = 10	< 75% = 6	< 3.0 = 11	RA = 1
	≥25 = 10	≥75% = 14	≥ 3.0 = 9	RG = 9
				CM = 7
				ST = 0
				MC = 4
Mechanical Engineering	< 25 = 4	< 75% = 9	< 3.0 = 13	RA = 2
	≥25 = 16	≥75% = 11	≥ 3.0 = 7	RG = 5
				CM = 2
				ST = 4
				MC = 7

Electrical Engineering	< 25 = 7	< 75% = 8	< 3.0 = 12	RA = 4
	≥25 = 13	≥75% = 12	≥ 3.0 = 8	RG = 2
				CM = 3
				ST = 1
				MC = 4
Business Administration	< 25 = 15	< 75% = 14	< 3.0 = 12	RA = 2
	≥25 = 15	≥75% = 6	≥ 3.0 = 8	RG = 9
				CM = 7
				ST = 2
				MC = 5
Banking and Finance	< 25 = 12	< 75% = 10	< 3.0 = 11	RA = 1
	≥25 = 9	≥75% = 10	≥ 3.0 = 9	RG = 5
				CM = 6
				ST = 6
				MC = 2
Insurance	< 25 = 8	< 75% = 7	< 3.0 = 13	RA = 2
	≥25 = 12	≥75% = 13	≥ 3.0 = 7	RG = 2
				CM = 7
				ST = 4
				MC = 0
Office Technology Management	< 25 = 13	< 75% = 11	< 3.0 = 11	RA = 0
	≥25 = 7	≥75% = 9	≥ 3.0 = 11	RG = 6
				CM = 7
				ST = 2
				MC = 5
Accounting	< 25 = 9	< 75% = 6	< 3.0 = 10	RA = 3
	≥25 = 11	≥75% = 14	≥ 3.0 = 10	RG = 5
				CM = 6
				ST = 5
				MC = 1
Marketing	< 25 = 8	< 75% = 14	< 3.0 = 13	RA = 2
	≥25 = 12	≥75% = 6	≥ 3.0 = 7	RG = 4
				CM = 4
				ST = 8
				MC = 2
Mass Communication	< 25 = 12	< 75% = 5	< 3.0 = 14	RA = 0
	≥25 = 8	≥75% = 15	≥ 3.0 = 6	RG = 10
				CM = 5
				ST = 0
				MC = 0
Estate Management	< 25 = 14	< 75% = 10	< 3.0 = 9	RA = 3

	≥25 = 6	≥75% = 10	≥ 3.0 = 11	RG = 8
				CM = 5
				ST = 3
				MC = 1
Architecture	< 25 = 8	< 75% = 15	< 3.0 = 8	RA = 0
	≥25 = 12	≥75% = 5	≥ 3.0 = 12	RG = 11
				CM = 0
				ST = 4
				MC = 5
Survey	< 25 = 14	< 75% = 13	< 3.0 = 11	RA = 0
	≥25 = 6	≥75% = 7	≥ 3.0 = 9	RG = 9
				CM = 2
				ST = 2
				MC = 7

The samples draws are 340

Age	**Attendance**	**CGPA**	**Common Behavior**
< 25 =	< 75 = 184	< 3.0 = 189	RA = 38
≥25 = 166	≥75 = 156	≥ 3.0 = 151	RG = 115
			CM = 86
			ST = 54
			MC = 47

Therefore, the probability for age = 174/340 = 0.51

≥ 25 = 166/340 = 0.49

The probability of the attendance < 75

$= \frac{184}{340} = 0.54$

≥ 75 = $\frac{156}{340} = 0.46$

The probability of CGPA

< 3.0 = $\frac{184}{340} = 0.56$

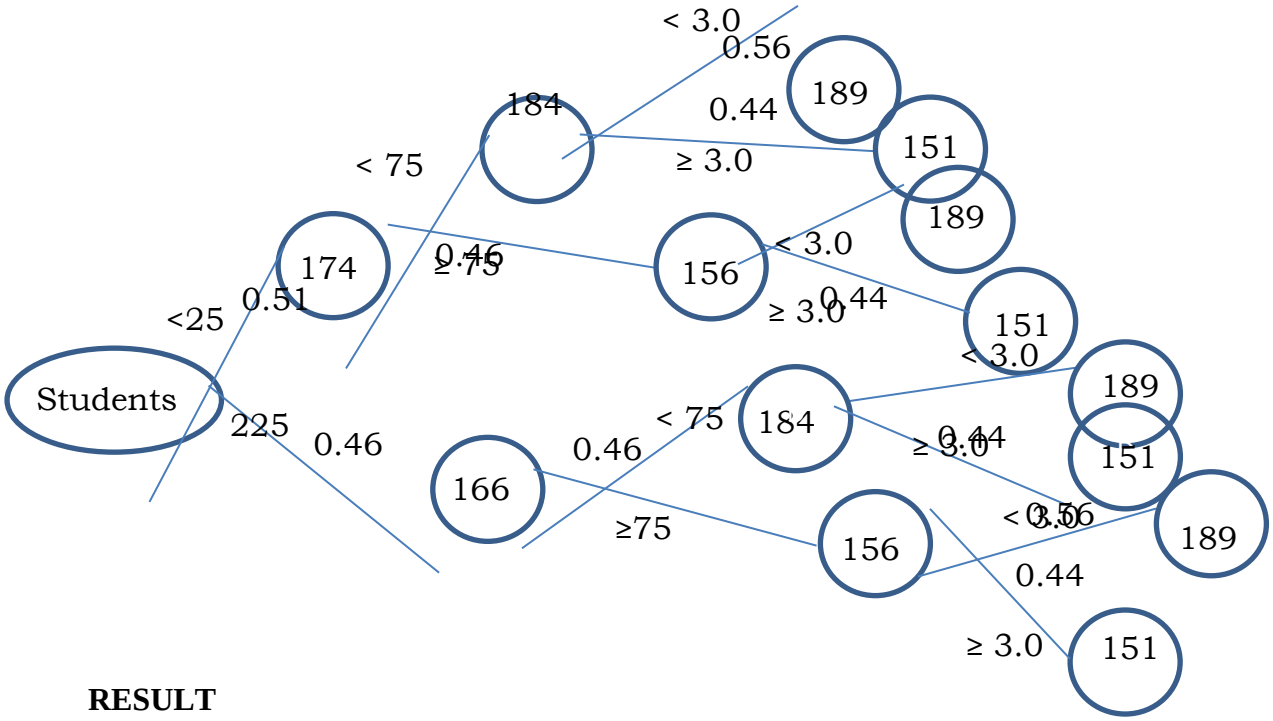
≥ 3.0 = $\frac{156}{340} = 0.44$

The probability of common behavior

RA = 38/40 = 0.11
RG = 115/340 = 0.34
CM = 86/340 = 0.25
ST = 54/340 = 0.16
MC = 47/340 = 0.14

1. ∴ The probability of someone < 25 to have an attendance < 75 and is < 3.0 = 174 (0.51) + 184 (0.54) + 189 (0.56) = 88.74 + 99.36 + 105.84 = 293.94.
2. The probability of someone ≥ 25 to have an attendance ≥ 75 and is ≥ 3.0 = 166 (0.49) + 156 (0.46) + 151 (0.44) = 219.54.

3. The probability of someone < 25 to have an attendance ≥ 75 and is ≥ 3.0 = 174 (0.51) + 156 (0.46) + 151 (0.44) = 22.94.
4. The probability of someone ≥ 25 to have an attendance < 75 and is < 3.0 = 166 (0.49) + 184 (0.54) + 189 (0.56) = 286.54.
5. The probability of someone < 25 to have an attendance ≥ 75 and is < 3.0 = 174 (0.51) + 156 (0.46) + 189 (0.56) = 88.74 + 71.76 + 105.84 = 226.34.
6. The probability of someone ≥ 25 to have an attendance < 75 and is ≥ 3.0 = 166 (0.49) + 184 (0.54) + 151 (0.44) = 81.34 + 99.36 + 66.44 = 247.14.
7. The probability of someone < 25 to have an attendance < 75 and is ≥ 3.0 = 174 (0.51) + 184 (0.54) + 151 (0.44) = 88.74 + 99.36 + 66.44 = 254.54.
8. The probability of someone ≥ 25 to have an attendance ≥ 75 and is < 3.0 = 166 (0.49) + 156 (0.46) + 189 (0.56) = 81.34 + 71.76 + 105.84 = 258.94.



RESULT

The result obtained from the model and the possible probabilities are:

1. P (< 25) + p (< 75) + p (< 3.0) gives 0.29394.
2. P (≥ 25) + p (≥ 75) + p (≥ 3.0) gives 0.21954.
3. P (< 25) + p (≥ 75) + p (≥ 3.0) gives 0.22654.
4. P (≥ 25) + p (< 75) + p (< 3.0) give 0.28654.
5. P (< 25) + p (≥ 75) + p (< 3.0) gives 0.26634.
6. P (≥ 25) + p (< 75) + p (≥ 3.0) gives 0.24714.
7. P (< 25) + p (< 75) + p (≥ 3.0) gives 0.25454.
8. P (≥ 25) + p (≥ 75) + p (< 3.0) give 0.25894.

The first result shows that majority of the students are less than age 25, have less attendance than the average and are below the CGPA 3.0.

The second result shows that very few students are more than 25, have attendance more than average and are above CGPA 3.0.
The third results show that few students are less than 25 years have attendance above the average and are above the CGPA 3.0.
The fourth result shows that a high number of students are more than 25, have less attendance more than the average and are below CGPA 3.0
The fifth result shows that after the 1st and 4th results, a good number of students are below 25years, have an attendance more than the average and are below the CGPA 3.0.
The sixth result shows that after the 2nd and 3rd results, a low number of students are above 25years, have attendance below the average and are above CGPA 3.0.
The seventh result shows that quite a number of students are less than age25 years have attendance less than the average and are above CGPA 3.0.
The eight result shows that a reasonable number of students are above age 25 years have attendance above the average and are below CGPA 3.0.
For common behaviors:

1. P (Reading in alone) = 0.11
2. P (Reading in group) = 0.34
3. P (Creaming) = 0.25
4. P (Sorting) = 0.16
5. P (Micro-chip) = 0.14

Interpretation
The first result means that every few students read alone.
The second result shows that majority of the students read in group.
The third result shows that high number of students cram.
The fourth result shows that quite a number of students sort.
The fifth result shows that few students use pre – written materials.

CONCLUSION – (Age, Attendance, Grade)
Having gone through several challenges while working on this project, the research concluded that large number of students in Ken Saro-Wiwa Polytechnic are below 25, have less attendance than the average and are below 3.0 and very few students in Ken Saro-Wiwa Polytechnic are above 25, have the average attendance and are above 3.0.

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