Role of Data Science and Analytics Model (Learn to Serve to Learn)for achieving the goal of the "New Education Policy" with NSS in higher education –A pilot CASE Study.

Research · August 2023

CITATIONS
0

READS
30

3 authors, including:

Shital Choudhar
Tuljaram chatuchand college baramati pune
1 PUBLICATION **0** CITATIONS

SEE PROFILE

JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Role of Data Science and Analytics model (Learn to Serve to Learn) for achieving the goal of the "New Education policy" with NSS in higher education - A pilot CASE Study.

Kardile Vilas Vasantrao*
Computer Science Department

Landage Vaibhav Prabhakar
Chemistry Department

Choudhar Shital Balu
Statistics Department

Tuljaram Chaturchand College, Baramati (Pune), Maharashtra, India.

Abstract

The aim and objective of education system is attempts to provide path of sustainable human development and making a responsible citizen of tomorrow's society. To satisfy the objective the education system's provides a platform to the students for acquire knowledge about the society, understand its sustainable development with develop the skill for potentially beneficial attitudes. National Service Scheme (NSS) plays vital role in accomplishing the aim and objective of education system "To utilize knowledge and useful skills into practice based on innovation". So, in the education system continuous research process carried out. In this context, there is a need system that process useful for analysis of knowledge and more specifically studies the outcome measurement and predictions. This study is tries to introduce a "Learn to Serve to Learn" model based on data science and-analytical process framework deal with waterfall model with NSS in education process.

.**Keywords**: Waterfall model, Data science, Education system, Social attitude, NSS.

Introduction:

The main objective of the education system is taking efforts for provide a platform to the students for adopt positive ethics in life, obtain the skills for utilize their knowledge effectively to the beneficial and sustainable human development. Although, we have very good knowledge and its sources, but its implementation depends entirely on the students and their ability to accept the knowledge and skills they have [1]. With this consideration Indian education policy maker restructuring new and forward looking vision for "India's Higher Education System" and introduce new education policy "NEP-20". In this paper author focuses Indian education system with its constrain and an opportunity. Moving forward this study attempt to introduce a "Learn to Serve to Learn" model for abstract the need of data science and highlight role of national service scheme (N.S.S), in implementation of new education policy (NEP-20) with case study. Section II introduces the Hypothetical solution of model. In section III, Definition of Research Method used in study, in section IV, Observation and Discussion, in section V, Conclusion and feature scope Appreciation.

Indian Education System:

Indian educations system has very motivating, gorgeous and glorious history. It is traversed imparted orally by the mentors and mentee and skills based information passed one to next generation before invention of scripting. Moving forward it was conditioned by Vedas and Upnishada's threw the Gurkul (Indian traditional residential schools) in the form of Guru (Master) to Shishya (Schooler) after invention of scripting. The edge of 'Gurkul' is continued
till the era of foreign invasion [2, 4, and 5]. As a result of foreign invasion the 'Gurkul' education system come standstill in the 18th epoch and religious school was introduce. Till the 20th century, though it has very good result but have some drawbacks.

To resolve such drawbacks Mr. Macaulay introduce the non-religious western style and content schools. Such schools completely encapsulate the traditional structure of Indian education system.

After got impedance, Indian education system policy maker carry forward Mr. Macaulay recommended schools system with incorporation Mahatma Gandhi's philosophy and ideology "education to service" in the sense of present education system. The available education system, the students can be introduced to comprehensive and skill oriented knowledge [5].

There are various literatures available till today that focuses Strength, Weakness, opportunity and constraint of present educational system. As part of it, this type education system mostly focused on providing students with theoretical knowledge which affects their ability to use the knowledge they gained in the right way [7, 8]. Because it is not only literature explores but our personal experience that the most important for both parents and teachers is that students make high test scores.

Generally, this process is completely ignored what level of knowledge they actually got from everything they have learned. Moreover, after some time most of students are frequently forget the content of the books and scripts not long after passing the exam. According to this method, no assessment can be made of using the knowledge gained by the students for social benefit or in direct word; our education system is the inattention of the practice experiences. It's a very savior and most neglected national problem that is directly affects the education system
So, in 2020 Indian education policy maker reform education policy and introduce the New
Education Policy (NEP20) on the basis of following aspects [3]:

- Professional Education
- Adult Education and Life Long Learning
- Promotion of Indian Languages, Arts and Culture
- Technology Use and Integration
- Online and Digital Education: Ensuring Equitable Use of Technology

For implement such aspect in education system, policy maker introduce new education structure form primary to higher education. Education Policy maker decide to implement these vision in education system with following objectives:

- Institutional Restructuring and Consolidation
- Towards a More Holistic and Multidisciplinary Education
- Optimal Learning Environments and Support for Students
- Motivated, Energized and Capable Faculty
- Equity and Inclusion in Higher Education
- Teacher Education
- Re-imagining Vocational Education
- Catalyzing Quality Academic Research in all Fields through a New

National Research Foundation

- Transforming the Regulatory System of Higher Education

To achieve this goal, students must have the ability to understand self-responsibility, creativity, interpersonal skills and a sense of social responsibility while ensuring accurate analysis of available knowledge and successful decision-making [1,10].Unfortunately with available literature there is no single literature that will focus regarding to it. The purpose of this study is to introduce framework for pursing such goal.

Constrain

To progress of human society, students need to work for the benefit of the society through their own knowledge and abilities. For that, it is necessary to increase the creativity in their minds. Therefore, it is necessary to understand the students, make them understand the social applicability of the knowledge they have acquired, explore their untapped potential and understand their ideas. But, in this consideration, no publication of any kind has been found, so the importance of the subject presented must be considered.

Opportunity:

The main objective of today's education system is sustainable human development. For that, knowledge is active and actionable. So, it is necessary to acquire analytical and problem-solving skills from the point of view of creating knowledge through action. For that it is necessary, not only to define and design a practical model to implement the acquired knowledge and skills in the society but also develop system that process useful analysis of knowledge and more specifically studies the outcome measurement and prediction. With this consideration author try to attempt to introduce a “Learn to Serve to Learn” model on the basis of data science and analytics conceptual framework deal with waterfall model. “Learn to Serve to Learn” models basic aim is to assist education system for implement the NEP-20 with NSS. With this consideration estimated model have following objective for providing opportunity to student

- Understanding oneself from a social point of view
- To understand the social problems related to the acquired knowledge and find useful solutions for its elimination from the acquired knowledge.

- To highlight the social satisfaction factor of a useful solution
- Bringing knowledge into action and creating new knowledge through action

National service Scheme: National Service Scheme (NSS) was introduced in 1969 with the primary objective of developing the personality and character of the student youth through voluntary community service. Very appropriately, the motto of NSS is "NOT ME, BUT YOU". It promotes social welfare among the students, to build and enable patriotism, national unity, social commitment through volunteer services by the two activities ('Regular program activity' and 'Winter Special Workforce Rites Camp'). [22-26].

Data science and Analytics: Wikipedia defines "Data science (DS) as extracting useful knowledge from data by employing techniques and theories drawn from many fields within the broad areas of mathematics, statistics, and information technology". While DS analytics is emphasizes the computational aspects of practically carrying out data analysis, including acquisition, management, analysis of a wide variety of data [9-16].

Waterfall Model: The software development life cycle's first approach is Waterfall approach introduced By Literate W. Royse. This used widely in Software Engineering to ensure success of the project. In "The Waterfall" approach, the whole process of software development is divided into separate phases. In this Waterfall model, typically, the outcome of one phase acts as the input for the next phase sequentially [27.28, 29]

.Section – II Hypothetical Solution:

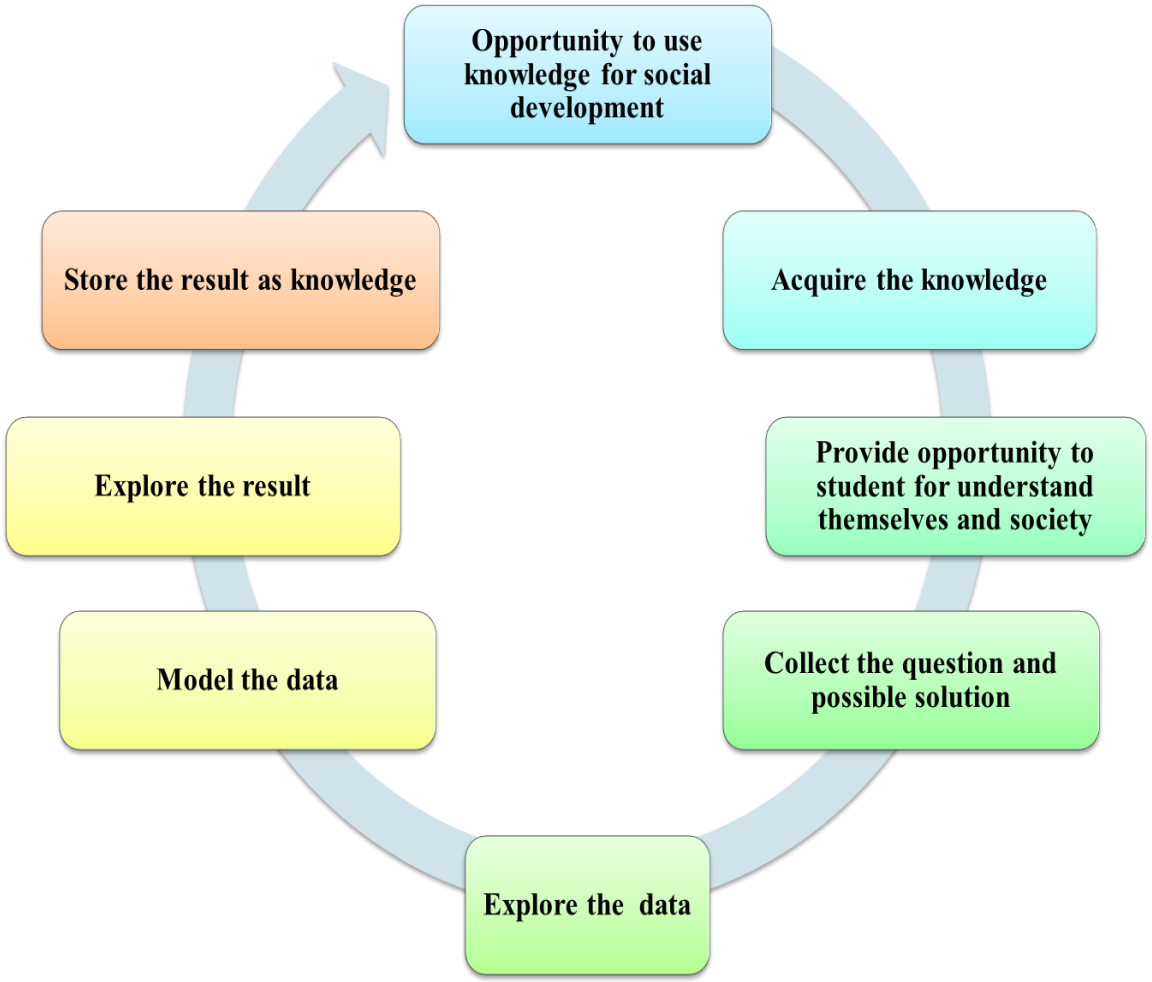


Figure. 1: Hypothetical Solution NSS with DSA in achieving the goal of the " New Education policy"

To satisfy need of such model, this study seeks out an opportunity with National Service Scheme and Data science and Analytics concept's implementation's combination.

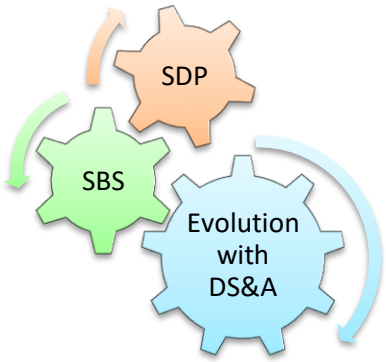
Research approach Method and Methodology

This study utilizes the phenomena base positivist mix approach of qualitative and quantitative method for the purpose of data collection, data analysis and interpretation of the evidence with following research method and methodology.

Section – III Research Method:

Research method is a set of the numerous procedures, schemes, algorithms, etc. used in research. Basically, Research method is uses for explore the Intimal level plan, theoretical procedures, experimental studies, numerical schemes, statistical approaches, etc.

Logical model:



Define Social domain Problem

Social Beneficial Solution

Evolution with Data science and analytics

Figure. 2: Logical Solution NSS with DSA in achieving the goal of the " New Education policy"

Section – IV Research methodology: Research methodology is a systematic way to solve a problem. It is a science of studying how research is to be carried out. Essentially, the procedures by which researchers go about their work of describing, explaining and predicting phenomena are called research methodology. It is also defined as the study of methods by which knowledge is gained. Its aim is to give the work plan of research.

Physical Model:

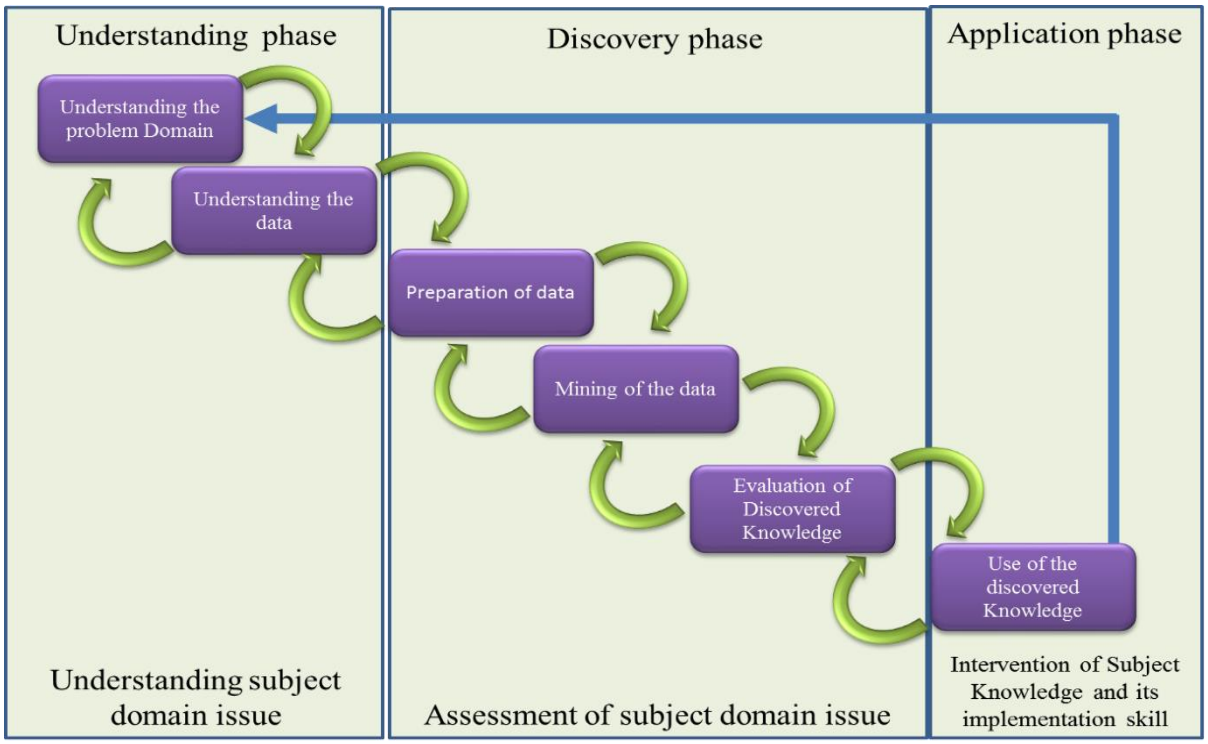


Figure. 3: Implementation software development waterfall model[1] with Cios et al.'s process model[2].
(Source: adapted from [1]Software engineering Rosy's waterfall model and [2] Cios and Kurgan (2005))

Algorithm:

Table 1: Algorithm of conceptual model of NSS with DSA in achieving the goal of the " New Education policy

Sr. No.	Step	Declaration
1	Step 1	Start
2	Step 2	Understand the Problem Domain
3	Step 3	Understand the Data
4	Step 4	Preparation of Data
5	Step 5	Understand the Requirements and define test script
6	Step 6	Define the Project
7	Step 7	Elaboration the task and preparation of modulation
8	Step 8	Select the team and allocation the task
9	Step 9	Hands on training to team
10	Step 10	Evaluate the team by Implementation pilot project
11	Step 11	Actual Implementation a team on filed
12	Step 12	Collect data
13	Step 13	Data processing
14	Step 14	Preparation of Outcome
15	Step 15	Validate test script
16	Step 16	If outcome is validate then publish it or go to step 5
17	Step 17	End ;
Note: The above step can be change and modified as per circumstance and project need		

Section – V: Implementation the conceptual model with case study.

Step-1: Understand the Problem domain: To understand students, explore their untapped potentials and understand their ideas with a view to encouraging them to make creative efforts and maximize their potential. So, to provide opportunity for students to gain the ability, understand self-responsibility, creativity,

interpersonal skills and a sense of social responsibility with ensuring accurate analysis of available knowledge and prepare a successful decision-making in handling realistic problem. With this consideration and to test "Learn to Serve to Learn", we are trying to attempt to contribute Maharashtra State Governments, "Mazi Vasundhara" project.

India is a developing country; Maharashtra is a one of the leading state in this developing transformation. Considering the available population and their needs, various projects are underway to maintain optimal infrastructure to balance the demand and supply of daily needs, including construction of new roads or railways or widening of existing corridors, while various projects are underway to balance the environment also. As a part of it, the Department of Environment and Climate Change of the Government of Maharashtra is implementing an initiative called 'My Earth'.

The scheme is being implemented in Maharashtra with the aim of enabling the citizens to make conscious efforts for the betterment of the environment by educating the citizens about the effects of climate change and environmental problems and to enable them to make conscious efforts to improve the environment [20-21].

As a part of this, with Baramati municipal council, Tuljaram Chaturrachand Arts, Science and Commerce College's National Service Scheme (NSS), and other (200) student volunteers and 10 (4 Teaching faculty,4 BMC Admissive officer with 2 NSS Program officer) of the collegecarried out tree counting campaign in '19 wards of Baramati Municipal council from 24th February 2020 to 21st March 2022.

Step-2: Understand the Data (Current Status): According to the World Bank report, and as per government report the forest in India covers, the tree cover of the country is slightly increased. (2.85%) in 2017. More over As per report published by Government of India the total forest cover in India as per 2019 assessment In Maharashtra state all tree stands with canopy density over 10% [20].

Step-3, 4 and 5: Preparation of the Data and Understand the requirement, Define Test script: To understand the current status of Trees and validate its location in the premises of Baramati Municipal Council, Baramati. The Tree counting with Geo tagging photo's campaign is carried out. All the data collected by volunteer is collected by Google form in strutted format.

Step -6 Define the project: To execute such campaign very first understand the definition of tree. "Definition of tree under the Maharashtra (urban areas) tree preservation act ,1975 as follows -Trees whose census is to be carried out should have min 10 cm girth and 3m height respectively" Moreover, those people who are going to count tree must be identify tree's classification and Categories. With this consideration, there is need to make Identification chart of trees.

Step-7 Elaboration the task and preparation of modulation (Resources):

To execute tree counting campaign following resource collect

1. Prepare an Identification chart of tree with the help of expert of Botany Department.
2. Conduct Physical training program of tree counting and geo tagging with the Environmental Science and Geography Department.
3. Baramati municipal Council arranged Measuring Tapes and other sources like Geo-tagging camera application etc. for respective field work of tree census.
4. Google form is design and developed for the data collection like Volunteer Information, Ward Information, Tree's Information (Name of tree in mother tongue, Height (approximately), Dimeter (width), Scientific name, Status…etc.)
5. Classification data in the format of Tree, Plant Serb, Herb as per its Height and diameter (width)

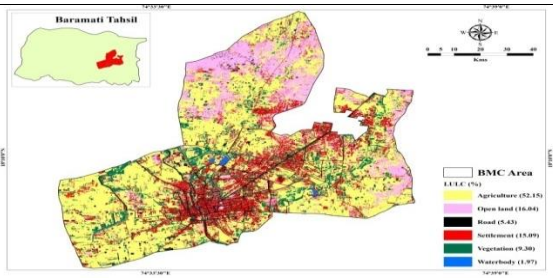
Limitation: While conducting the campaign we faced following limitations

1. To measure the height of tree is a difficult task.
2. To store geo- tagging picture with google drive is a tremendous bulky task.
3. As per the definition of Tree, only those plants which are planted before 5-10 year and having min 10 cm girth and 3 Mt. heights respectively are measured and counted as a Tree. So, here we mention that plants which are planted in last 5 year are considered as plant. So, we have considered plants separately.

Step-8 Select the term and allocation the task (Method): Physically (26) groups in which each group have 4 volunteers. So total (171) volunteers worked on field within the limit of

19 wards of Baramati Municipal council Area, Baramati., whose ward wise map and locations are provided by town planning department of BMC. Location definition

Table 2: Define the location

	
Canapic map of Baramati	Sattelite immage of logcation byGoogle

Step 9 &10 Hands on Training and Implementation of pilot project

Table 3: Hands on Training and Implementation of pilot project

Step 11 Actual Implementation (Field Survey)

Table 4: Actual Implementation (Field Survey)

Step 12 Data collection:

Tree Census of Baramati Municipal Council was carried out during 22 February 2022 to 21st March 2022 in all Wards of city spread over and area of about 55 sq. Km. Geo coordinates of each tree were recorded using GPS camera. As per allocation of Baramati Municipal Council's 19 ward we allocate physically (26) groups in which each group have 7 volunteers.

Total (182) volunteers worked on field with google from and physical data collection form.

Table 5: Tree count of as per the google form collation

Ward No	Total	Ward No	Total	Ward No	Total
1	1532	7	3674	13	4327
2	3414	8	6654	14	5216
3	2613	9	3087	15	5594
4	4678	10	3057	16	4562
5	3248	11	2855	17	3234
6	3917	12	532	18	2888
Total			67532		

Sept 13 Data Processing (Data Analysis):

A) Data Visualization

After the collection of data as per Volunteer and Ward information, Tree's facts Name of tree in mother tongue, Height (approximately), Dimeter (width), scientific name, Status…etc.) Categories in (Indian and non-Indian) and Classification (as per define aspect of Tree, Plant, Serb and Herb.) of data carried out with SQL query).

Table 6: Association rule for define Query for classification of Data

Rule No	Aspect	Condition		
		Planted Year	Height	Girth \
R1	Tree	Y is between 5 and 10 yr.	H is between 3 and 5 mt.	G is between 10 and 20 cm
R2	Plant	Y is between 2 and 5 yr.	H is between 1.5 and 3 mt.	G is between 5 and 10 cm
R3	Serb	Y is between 1 and 2 yr.	H is between 0.5 and 1.5 mt.	G is between 2.5 and 5 cm
R4	Herb	Y is between 0.5 and 1 yr.	H is between 0.25 and 0.5 mt.	G is between 1 and 2.5 c.m.

The outcome of data classification is shown in following table (Table no 7)

Table 7: Classification of Data					
Ward No	Tree	Plant	Serb	Herb	Total
1	240	733	167	392	1532
2	1034	962	739	679	3414
3	560	234	861	958	2613
4	1620	700	1172	1186	4678
5	530	1263	651	804	3248
6	2066	112	1546	193	3917
7	1156	217	612	1689	3674
8	1678	2012	938	2026	6654
9	780	316	472	1519	3087
10	1186	874	678	319	3057
11	804	57	934	1060	2855
12	193	122	80	137	532
13	1689	1203	315	1120	4327
14	2026	1030	1488	672	5216
15	1519	1247	1535	1293	5594
16	319	357	2766	1120	4562
17	1060	716	676	782	3234
18	137	278	1776	697	2888
19	1120	368	415	547	2450
total	19717	12801	17821	17193	67532

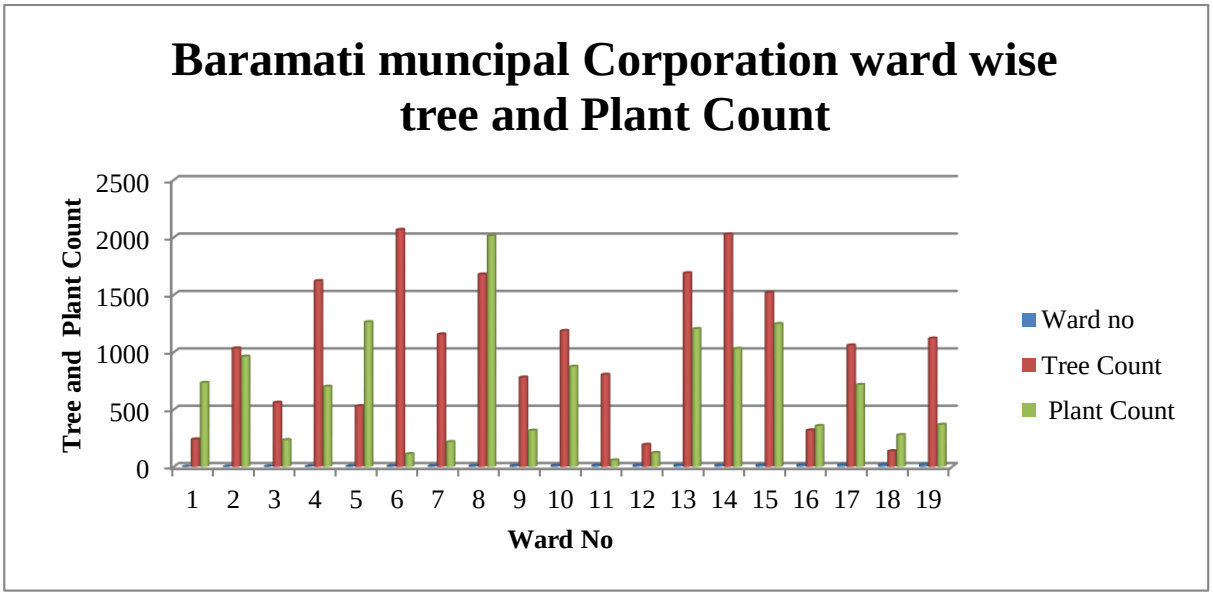
This classification of available data is shows ward wise tree, plant, Serb and herb count. (As per the definition of tree, in this study only trees and plants are considered. Serb and Herb is not considered in this trees count).

I) Ward Wise Tree and Plant count

Table 8: Ward wise Tree and Plant count				
Sr.no.	Ward no	Tree Count	Plant Count	Total
1	1	240	733	973
2	2	1034	962	1996
3	3	560	234	794
4	4	1620	700	2320
5	5	530	1263	1793
6	6	2066	112	2178
7	7	1156	217	1373
8	8	1678	2012	3690
9	9	780	316	1096
10	10	1186	874	2060
11	11	804	57	669
12	12	193	122	315
13	13	1689	1203	2892
14	14	2026	1030	3056
15	15	1519	1247	2766
16	16	319	357	676
17	17	1060	716	1776
18	18	137	278	415
19	19	1120	368	1488

Graphical representation

Ward wise total tree count: The extensive field work resulted into count of near about 19,717 trees (trees and plants - 32,518) in Municipal Council area.

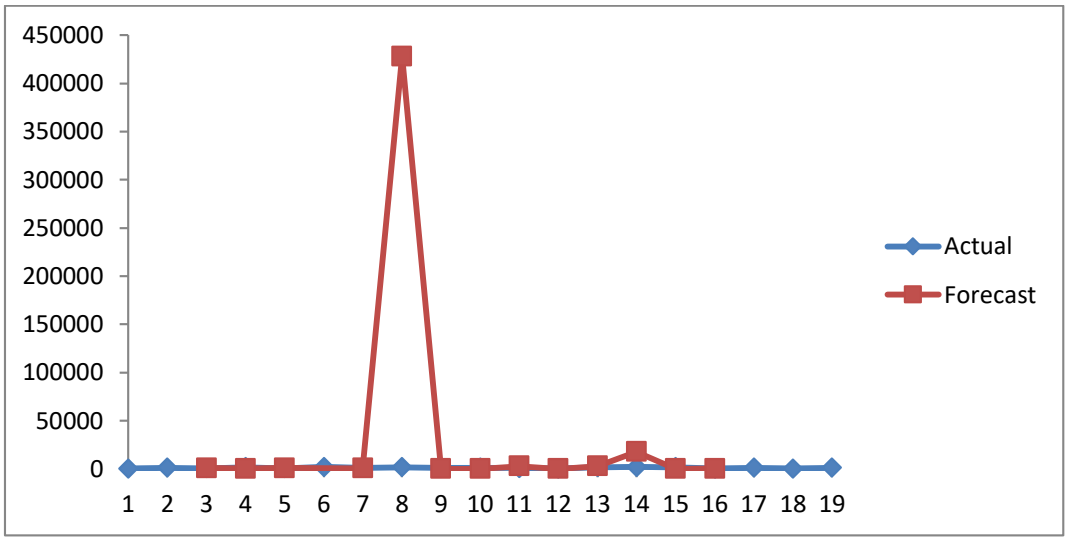


For each tree attributes like it's local name, scientific name, height, girth, health condition, ownership and GPS coordinates where recorded in the field.

II) Descriptive Statistics

Table 9: Districts Statistics				
	Tree	plant	Herb	Serb
Mean	1037.737	673.7368	937.9474	904.8947
Standard Error	140.6639	119.4985	150.117	116.0074
Median	1060	700	739	804
Mode	#N/A	#N/A	#N/A	1120
Standard Deviation	613.1396	520.882	654.3449	505.6645
Sample Variance	375940.2	271318.1	428167.3	255696.5
Kurtosis	-1.07245	0.661476	2.021489	-0.07214
Skewness	0.113974	0.917065	1.249203	0.478176
Range	1929	1955	2686	1889
Minimum	137	57	80	137
Maximum	2066	2012	2766	2026
Sum	19717	12801	17821	17193
Count	19	19	19	19

Graphical representation



The above table -8 figure indicates that in ward no 7,9,14 there are chances to improve the tree count and in ward no 1, 2, 6,8, 17,18, 19 need take effort for improve the tree count .

B) Data Exploration by using Regression Analysis

I) Simple Liner Regression

Table 10: Summary output	
Regression Statistics	
Multiple R	0.411868218
R Square	0.169635429
Adjusted R Square	0.120790454
Standard Error	574.9175737
Observations	19

Result is R Square (0.169635429) < 60%

The above result table no 10 shows 'R square' value is 0.169635429 approximately (0.2) reveal that 60% of the variability observed in the target variable is explained by the regression model.

Here variability in model is less than 60%. so, the model is not good fit

The above result shows there needs improve tree number for each ward.

II) Simple Liner Regression

Table 11: Simple Liner Regression					
ANOVA					
	df	SS	MS	F	Significance F
Regression	1	1147910	1147910	3.472935	0.079748
Residual	17	5619014	330530.2		
Total	18	6766924			

a

Table 12:								
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	711.0974297	219.3575	3.241729	0.004797	248.2937	1173.901	248.2937	1173.901
X Variable 1	0.484817501	0.260154	1.863581	0.079748	-0.06406	1.033694	-0.06406	1.033694

Regression model y=0.4848*X + 711.097

y=.4848*(50) + 711.097
y= 735.337
Approximately equal to y is 735

The simple regress indicate there is need to plant 735 trees in wards within 50 days

Step 14 Preparation of Outcome: Summary of the respective survey in tabular form is as given below –

Table 13: Outcomes		
Sr. No	Components	Result and Description
1	Number of Tree species	Total about 51 species
2	Number of individual trees	19,717
3	Dominant tree species	Gulmohar, Nilgiri, Shirish
4	Total wards covered	19
5	Healthy tree population	Near about 90 %
6	Number of Native species	95 %
7	Native population	Near about 90 %
8	Maximum trees in ownership	Government / public
9	Number of individual plants	12801
10	Number of individual Serb And Herb	35014
11	Suggestion	Need to 750 trees are to plant in each ward for each year

Total Population of Baramti (approximately) as per BMC: 16, 0000 as per 2011 population counting Tree ratio per population: 0.070767831 means near about Tree: Population (1:7) There is need to rich (1:3) means 33

Suggestion

To achieve aim and objective of education system there is need to attempts for develop curricular, co-curricular and extracurricular activities with same considerations

Table 14: Next five year plan for tree plantation								
Sr.no	W-No	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	Total
1	1	973	1723	2473	3223	3973	4723	17088
2	2	1996	2746	3496	4246	4996	5746	23226
3	3	794	1544	2294	3044	3794	4544	16014
4	4	2320	3070	3820	4570	5320	6070	25170
5	5	1793	2543	3293	4043	4793	5543	22008
6	6	2178	2928	3678	4428	5178	5928	24318
7	7	1373	2123	2873	3623	4373	5123	19488
8	8	3690	4440	5190	5940	6690	7440	33390
9	9	1096	1846	2596	3346	4096	4846	17826
10	10	2060	2810	3560	4310	5060	5810	23610
11	11	669	1419	2169	2919	3669	4419	15264
12	12	315	1065	1815	2565	3315	4065	13140
13	13	2892	3642	4392	5142	5892	6642	28602
14	14	3056	3806	4556	5306	6056	6806	29586
15	15	2766	3516	4266	5016	5766	6516	27846
16	16	676	1426	2176	2926	3676	4426	15306
17	17	1776	2526	3276	4026	4776	5526	21906
18	18	415	1165	1915	2665	3415	4165	13740
19	19	1488	2238	2988	3738	4488	5238	20178
Total		32326	46576	60826	75076	89326	103576	407706

Outcome: With this study this is abstract that the following points:

✓ This study conceptualizes and focuses the opportunity to implement new education policy in India. It abstracts the need and importance of execution of data science and analytics with its role by 'learn to serve to learn' model for multidisciplinary education.

✓ Most related studies evaluate qualities, outcome and prediction but here, in this paper presents a case study focuses actual training student participant with the experience of implementation "Class room learning" and its application. Here it is seen that participant students are very enthusiastically explore ideas, views. Moreover it is abstract lot of students are aware own untapped potentials and importance of creative efforts when Baramati Mulcipal Corporation awarded by Maharashtra government.

✓ The student's participants are able to understand the actual implementation of this application in society with its pros and cons and corn". This is a practical experience for students to understand the society and contribute themselves into nation building work. It is actual theme of new education policy.

✓ This study appreciate it is very initiative efforts regarding to such aspect. Moreover though several things are remain behind to address but this study hopes that it is assist to researcher for learn to serve the society and present a different practice in education.

Discussion

The main objective of today's education system is sustainable human development. For that, knowledge is active and actionable. This paper attempt to describe, it is necessary to acquire analytical and problem-solving skills from the point of view of creating knowledge through action with estimated educational model. It is necessary not only to define and design a practical model to implement the acquired knowledge and skills in the society but also develop system that process useful analysis of knowledge and more specifically studies the outcome measurement and prediction. In this consideration there is need to following point.

- Understanding own-selves in the relation of society.
- Understand social issues related to acquired knowledge.
- Finding a useful solution to such a question.
- Interviewing usefulness of solution.

Conclusion

In the concluding, this study accepts "The role Data Science and Analytics (DSA) with NSS in achieving the objectives of the education system and its implementation.

This study attempt to stimulate further research and practice in the use of data science for education by presenting model that is applicable to achieve these goals.

This model can help ensure that quality of results, contribute to better understanding the techniques behind the model and lead to faster, more reliable, and more manageable knowledge discovery.

Through there is needed to validate more case studies with this application to define its effectiveness for define itself as a good option for effective learning Moreover author accepts this is very initial attempt but it contributes to the development of better intervention support for implementing an education policy and assist for effective learning. There is need complete exclusive effort that will explore each and every aspect and its

influence clearly.

.

Reference:

1. A.A. Lipnevich, R.D. Roberts, Noncognitive skills in education: Emerging research and applications in a variety of international contexts. Learn. Individ. Differ. 22(2), 173–177 (2012). doi:10.1016/j.lindif.2011.11.016
2. Dr. Rajashree N.Pandya (2014) "Indian Education System- A Historical Journey" International Journal for Research in Education Vol. 3, Issue:3, May-June 2014 (IJRE) ISSN: (P) 2347-5412 ISSN: (O) 2320-091X
3. Government of Inida (2022-23) " New education policy-2020"
4. https://ncert.nic.in/ (2022-23) "Ancient Education System of India" Text book
5. Dr. Kulwinder Pal "Development of Education System" Lovely professional university Usi Publications
6. B. Baumer, (2015)." A data science course for undergraduates: Thinking with data". Am. Stat. 69(4), 334–342 doi:10.1080/ 00031305.2015.1081105
7. Dilip Chinoy (2014) "The Aspiring youth : Opportunities & Challenges of Skill Development in India. Global Partnership: Building a better future,WFCP(2014) National Skill development corporation".
8. Mallappa B Salagare (2016) "The problems and status of modern youth" Indian Literature and Culture Today – An Inter – Disciplinary Peer – Revived International Research Journal. Vol 3, Issue 11, Nov 2016. 9. V. Dhar, "Data science and prediction". Commun. ACM 56(12), 64–73 (2013). doi:10.1145/2500499
10. J.S. Kinnebrew, K.M. Loretz, G. Biswas, A contextualized, differential sequence mining method to derive students' learning behavior patterns. J. Educ. Data Min. 5(1), 190 (2013)
11. K.R. Koedinger, S. D'Mello, E.A. McLaughlin, Z.A. Pardos, C.P. Rose, Data mining and education. Wiley Interdiscip. Rev. Cogn. Sci. 6(4), 333–353 (2015). doi:10.1002/wcs.1350
12. F. Provost, T. Fawcett, Data science and its relationship to big data and data-driven decision making. Big Data 1(1), 51–59 (2013). doi:10.1089/big.2013.1508
13. F Provost, T Fawcett, Data Science for Business: What you need to know about data mining and dataanalytic thinking (Sebastopol, CA: O'Reilly Media, Inc, 2013)
14. Provost, F., & Fawcett, T. (2013). Data Science and Its Relationship to Big Data and Data-Driven Decision Making. Big Data, 1, 51-59.https://doi.org/10.1089/big.2013.1508
15. J. Hardin, R. Hoerl, N.J. Horton, D. Nolan, B. Baumer, O. Hall-Holt, P. Murrell, R. Peng, P. Roback, D.T. Lang, M.D. Ward, Data science in statistics curricula: Preparing students to "think with data".Am. Stat. 69(4), 343–353 (2015). doi:10. 1080/00031305.2015.1077729
16. Liu and Huang Smart Learning Environments (2017) "The use of data science for education: The case of social-emotional learning"Smart Learning Environments ,SpringerDOI 10.1186/s40561-016-0040-4
17. M. Hoque, R.W. Picard, Rich nonverbal sensing technology for automated social skills training. Computer 47(4), 28–35 (2014)
18. M.A. Brackett, S.E. Rivers, M.R. Reyes, P. Salovey, Enhancing academic performance and social and emotional competence with the RULER feeling words curriculum. Learn. Individ. Differ. 22(2), 218–224 (2012). doi:10.1016/j. lindif.2010.10.002
19. Child Trends, Measuring Elementary School Students' Social and Emotional Skills: Providing Educators with Tools to Measure and Monitor Social and Emotional Skills that Lead to Academic Success, 2014. Retrieved from http://www. childtrends.org/wp-content/uploads/2014/08/2014-37CombinedMeasuresApproachandTablepdf1.pdf
20. Indian State of forest report 2019 (isfr-2019-vol-ii-maharashtra)
21. Indian Express 21 march 2022 (https://indianexpress.com/article/cities/pune/outbreak-set-to-stall-treeplantation-in-maharashtra-6459296/)
22. Roopali Jain National Youth Policy(2014), Ministry of Youth affairs and sport, Government of India
23. National Service scheme.(http://nss.gov.in)
24. H. H. Parmar (2019) "National service scheme an opportunity for youth to contribute in nation building"ISSN 2277-7733 Volume 7 Issue 4, March 2019
25. S. Parasuraman,Kkhalil Ahmed, SamanAfroz and SaigitaChitturu (2010) "An Evaluation Study of NSSin India" THE INDIAN JOURNAL OF SOCIAL WORK, Tata Institute of Social Sciences
26. Ms. Gurmeet Hans is Senior Programme Officer, Commonwealth Youth Program: Asia Centre "STUDENT VOLUNTEERS FOR SOCIAL SERVICE"
27. Walker Royce, "Software Project management-unified Frame work" Pearson.First edition 2006,ISBN : 978-81-7758-378-6.
28. Barry W. Boehm. Software Engineering Economics. Prentice Hall, Engle-wood Cli_s, NJ, 1981.
29. Roger S. Pressman, Software Engineering-A practitioner's Approach, Fifth edition, McGraw-Hill, 2001