

**Minor Research Project - Final Report**

(July 2017 – June 2019)

**BIG DATA ANALYTICS FOR ASPECT BASED  
SENTIMENT ANALYSIS OF STUDENTS' OPINION IN  
DIGITALIZED HIGHER EDUCATION**

(UGC Ref. No.: F. MRP-6527/16 (SERO/UGC) June - 2017)

(Link No: 6527 Cbmcode: TNBD007 UniqueID: RHTSJC)

Submitted to

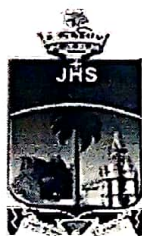
**UNIVERSITY GRANTS COMMISSION**

South Eastern Regional Office (SERO), Hyderabad – 500 001

Principal Investigator

**Dr. A. JENIFER JOTHI MARY**, M.Sc., B.Ed., M.Phil., Ph.D., SET

Assistant Professor in Computer Science



**PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE**

**ST. JOSEPH'S COLLEGE (AUTONOMOUS)**

Accredited at A++ Grade (4<sup>th</sup> Cycle) by NAAC

Special Heritage Status Awarded by UGC

College with Potential for Excellence by UGC

DBT-STAR & DST-FIST Sponsored College

Tiruchirappalli – 620 002

23-01-2020  
Trichy

From

A. JENIFER JOHTI MARY  
Assistant Professor,  
PG and Research department of Computer Science  
St. Joseph's College (Autonomous)  
Tiruchirappalli-02.

To

Joint Secretary,  
South Eastern Regional Office (SERO),  
A.P.S.F.C. Building (4<sup>th</sup> Floor),  
P.B. No.152, Chirag-Ali-lane,  
Hyderabad -500001.

Dear Sir,

**Sub:** Submission of Minor Research Project - Final Report- Reg.

I have attached the final report of the Minor Research Project titled "**Big Data Analytics for Aspect Based Sentiment Analysis of Students' Opinion in Digitalized Higher Education**" (UGC Ref. No. : F.MRP -6527/16(SERO/UGC) June- 2017), (Link No.:6527 Comcode: TNBD007 UniqueID:RHTSJC), carried out by me. The attachment contains,

1. Utilisation Certification for the sanctioned amount
2. Project completion certificate
3. Accession and Asset certificate
4. Report of the work done
5. Publication and presentation details
6. Sanctioned Letter Copy

You may acknowledge the receipt of the same.


Thanking You.

Yours Sincerely,

  
(A. Jennifer Jothi Mary)

Forwarded by



  
(Rev. Fr. Principal)  
PRINCIPAL  
ST. JOSEPH'S COLLEGE  
(AUTONOMOUS)  
TIRUCHIRAPPALLI 620 002

UNIVERSITY GRANTS  
COMMISSION BAHADUR SHAH  
ZAFAR MARG NEW DELHI – 110 002

Utilization certificate

Certified that the grant of Rs. 1,93,990/- (Rupees one lakh ninety three thousand nine hundred and ninety only) received from the University Grants Commission under the scheme of support for Minor Research Project entitled Big Data analytics for aspect based sentiment analysis of students' opinion in digitalized higher education vide UGC letter No. F. MRP-6527/16 (SERO/UGC), dated 30 June 2017 has been fully utilized for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission.



SIGNATURE OF THE  
PRINCIPAL INVESTIGATOR

[A. JENIFER JOTHI MARY]



PRINCIPAL

(Seal)  
PRINCIPAL  
ST. JOSEPH'S COLLEGE  
(AUTONOMOUS)  
TIRUCHIRAPPALLI 620 002



STATUTORY AUDITOR

ROY JOHN THOMAS, B.COM., F.C.A.,  
CHARTERED ACCOUNTANT  
M. No: 200 / 25188





**UNIVERSITY GRANTS COMMISSION  
BAHADUR SHAH ZAFAR MARG  
NEW DELHI – 110 002**

**STATEMENT OF EXPENDITURE IN RESPECT OF MINOR RESEARCH PROJECT**

1. Name of Principal Investigator : **A. Jenifer Jothi Mary**
2. Deptt. Of PI : **PG and Research Department of Computer Science**
- Name of the College : **St. Joseph's College (Autonomous),  
Tiruchirappalli – 620002,  
Tamil Nadu, India.**
3. UGC approval Letter No. and Date : **F. MRP-6527/16 (SERO/UGC), 30 June 2017**
4. Title of the Research Project : **Big Data analytics for aspect based sentiment analysis of students' opinion in digitalized higher education**
4. Effective date of starting the project : **1<sup>st</sup> July 2017**
5. a. Period of Expenditure : **From July 2017 to June 2019**
- b. Details of Expenditure : a. Total amount approved: **Rs. 1, 93,990.00**  
b. Total expenditure : **Rs. 1, 96,853.00**

S.No.	Item	Amount Approved (Rs.)	Expenditure Incurred (Rs.)
i.	Books & Journals	30000.00	30065.00
ii.	Equipment	118990.00	118990.00
iii.	Contingency including special needs	20000.00	21244.00
iv.	Field Work/Travel (Give details in the proforma ).	15000.00	16554.00
v.	Hiring Services	10000.00	10000.00
vi.	Chemicals & Glassware	0.0	0.0



1. if as a result of check or audit objection some irregularly is noticed at later date, action will be taken to refund, adjust or regularize the objected amounts.

2. It is certified that the grant of Rs. 1,93,990 (Rupees one lakh ninety three thousand nine hundred and ninety only) received from the University Grants Commission under the scheme of support for Minor Research Project entitled Big Data analytics for aspect based sentiment analysis of students' opinion in digitalized higher education vide UGC letter No. F. MRP-6527/16 (SERO/UGC), dated 30 June 2017 has been fully utilized for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission.

  
(A. Jennifer Jothi Mary)

SIGNATURE OF THE PRINCIPAL  
INVESTIGATOR

  
(Rev. Dr. M. Arockiasamy Xavier SJ)

PRINCIPAL  
PRINCIPAL  
ST. JOSEPH'S COLLEGE  
(AUTONOMOUS)  
TIRUCHIRAPPALLI 620 002



**UNIVERSITY GRANTS  
COMMISSION BAHADUR SHAH  
ZAFAR MARG NEW DELHI - 110 002**

**STATEMENT OF EXPENDITURE INCURRED ON FIELD WORK**

**Name of the Principal Investigator: A. Jenifer Jothi Mary**

Name of the Place visited	Duration of the Visit		Mode of Journey	Expenditure Incurred (Rs.)
	From	To		
Amakrishnan College, Trichy	6/5/2017	6/5/2017	Car	1100.00
Anna University, Visakhapatnam	7/8/2017	7/15/2017	Train	2100.00
Shankara Institute of Engineering and Technology, Kaladi, Kerala	8/11/2017	8/14/2017	Train	1350.00
College, Trichy	8/29/2017	8/28/2017	Car	1200.00
Raj Annapackiam College for Women, Tirukulam	9/14/2017	9/14/2017	Car	1800.00
Arsha Engineering College, Chennai	10/26/2017	10/28/2017	Train	864.00
Institutions Engineering & Polytechnic College, Coimbatore	11/3/2017	11/6/2017	Train	990.00
Ganathan Engineering college, Coimbatore	11/23/2017	11/23/2017	Train	175.00
St. Mary's Jayanti College, Bangalore	3/9/2018	3/9/2018	Train	255.00
Pranchal University, Dehradun	4/18/2018	4/23/2018	Train	5020.00
CC College, Trichy	6/22/2018	6/22/2018	Car	1700.00

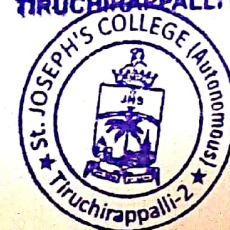
Certified that the above expenditure is in accordance with the UGC norms for Major Research Projects.



(A. Jenifer Jothi Mary)  
SIGNATURE OF THE PRINCIPAL  
INVESTIGATOR

(Rev. Dr. M. Arockiasamy Xavier SJ)

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(AUTONOMOUS)  
TIRUCHIRAPPALLI 620 002



**CONSOLIDATED STATEMENT OF EXPENDITURE INCURRED ON  
THE MINOR RESEARCH PROJECT – FINNAL REPORT  
(FOR THE ADMISSIBLE TENURE OF THE PROJECT)  
FROM JULY 2017 TO JUNE 2019**

**Name of the P.I & DEPT.:** A. JENIFER JOTHI MARY

Assistant Professor, Department of Computer Science  
St. Joseph's College (Autonomous), Tiruchirappalli– 620002

**Title of the Project:** Big Data Analytics for Aspect Based Sentiment Analysis of Students' Opinion in Digitalized Higher Education

**UGC Ref. No. :** F.MRP -6527/16 (SERO/UGC) June - 2017  
(Link No.:6527 Comcode: TNBD007 UniqueID: RHTSJC)

**1. BOOKS AND JOURNALS**

S. No	Details	Bill No	No. of Books	Date	Amount
1.	Sentiment analysis, B2A UK Cambridge university press (Amazon), chennai.	500720	1	23/08/2017	4323.00
2.	Learning social media analytics with R, Repro Knowledgecast (amazon), Mumbai.	QWCA-51108	1	25/08/2017	849.00
3.	Machine learning for big data developers and technical professional, JBCPD (Amazon), Tamilnadu.	MAA4-86843	1	25/08/2017	540.00
4.	Big data, data mining and machine learning, Prakash eSolutions (Amazon), Tamilnadu.	MAA4-78530	1	25/08/2017	560.00
5.	Machine learning in python, Vikas Book House (Amazon), Pune.	SPNA-65070	1	25/08/2017	443.00
6.	Problem solving and python programming, PR & SONS, Tamilnadu.	4017	1	30/08/2017	260.00
7.	Python social media analytics, Repro Knowledgecast (amazon), Mumbai.	QWCA-117877	1	29/10/2017	898.00



8.	Big data, black book: covers Hadoop 2, MapReduce, hive, yarn, pig, R and data visualization, JBCPD (AMAZON), Tamilnadu.	MAA4-201766	1	29/10/2017	597.00
9.	Hadoop 2 quick start guide: Learn the essentials of big data computing in the Apache Hadoop 2 ecosystem, Introducing data science: Big data, machine learning and more, using python tools, USB Publishers (Amazon), Tamilnadu.	MAA4-144111	2	16/11/2017	904.00
10.	Big data fundamentals: concepts drivers: concepts, drivers and techniques, Prakash eSolutions, Gurganon.	DEL4-393181	1	16/11/2017	231.00
11.	How to Write and Publish a Scientific Paper, 8th Repro Knowledgecast Ltd., Mumbai.	BOM1-1702	1	11/12/2017	2817.00
12.	Analytics in a big data world: the essestial guide to data science and its applications, USB Publishers, Tamilnadu.	MAA4-186699	1	21/12/2017	559.00
13.	Core python programming, Mittal books, Gurganon.	DEL4-600771	1	29/01/2018	514.00
14.	Analytics: data science, data analysis and predictive analytics for business, Prakash eSolutions, Gurgaon.	DEL4-6095587	1	29/01/2018	988.00
15.	Big data and Hadoop, Khanna Book Publishing company private limited, Delhi.	IN-465	1	29/01/2018	510.00
16.	Hands-on machine learning with scilit-learn and tensorFlow: concepts, tools, and techniques to build intelligent systems, Hands-on programming with R, Hadoop: the definitive guide, Learning Spark: Lightning-fast big data analysis, Shroff Publishers, Maharashtra.	BOM4-24860	4	29/01/2018	3475.00

17.	Hands-On Programming with R, Shroff Publishers, Maharashtra.	BOM4-112451	1	12/02/2018	650.00
18.	Data Science From Scratch: First Principles with Python, Infinity Books- Fast Delivery, Maharashtra.	405-5874654-7895147	1	25/02/2018	575.00
19.	Big Data and Analytics, STUDENT BOOK STALL V.V.NAGAR.	405-9473648-1741958	1	20/02/2018	588.00
20.	Programming and Problem Solving with Python, Ashok Namdev Kamthane, BOOKS & EQUIPMENT DISTRIBUTORS	405-3836647-6147529	1	28/3/2018	439.00
21.	Research Methodology : Methods And Techniques, Cloutail India Private Limited, Tamilnadu.	405-3085282-8989920	1	28/3/2018	419.00
22.	Deep learning for beginners: concepts and algorithms, Atlantic Publishers, Delhi.	In-10641	1	12/5/2018	1322.00
23.	Statistics for data science, Repro Knowledgecast, Maharashtra.	QWCA-218299	1	25/05/2018	718.00
24.	Principles of data science, RLBD-ON-WEB, Hyderabad.	HYD8-782	1	25/05/2018	799.00
25.	Principles of soft computing, Prakash eSolutions, Karnataka.	QSHS-221381	1	25/05/2018	577.00
26.	Internt of Things, Mittal Books, Karnataka.	QSHS-255981	1	25/05/2018	540.00
27.	Data science algorithms in a week, SansRack Publishing Solutions, Tamilnadu.	QSIJW-6860	1	28/05/2018	719.00
28.	Data science and big data analytics: Discovering, analyzing, visulalizing and presenting data, Repro Knowledgecast, Maharashtra.	BOM3-234504	1	28/05/2018	1439.00
29.	Big data analytics for cloud, IoT, and cognitive computing, UBSPD (Amazon), Tamilnadu.	MAA4-198562	1	25/05/2018	559.00
30.	R for everyone: advanced analytics and graphics, Mittal books (Amazon), Karnataka.	QWRE-142542	1	25/05/2018	649.00

31.	Data smart: Using data science to transform information into insight, Repro Books-on-Demand (Amazon), Maharashtra.	BOM3-345267	1	25/05/2018	679.00
32.	Practical statistics for data scienetists: 50 essential concepts, Shroff Publishers (Amazon), Thane.	BOM4- 132414	1	25/05/2018	925.00
<b>Total</b>					<b>30,065.00</b>

*[Signature]*  
Principal Investigator

[A-JENIFER JOYI MARY]

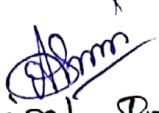
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PRINCIPAL  
St. JOSEPH'S COLLEGE  
(AUTONOMOUS)  
TIRUCHIRAPPALLI 620 002





## 2. EQUIPMENTS

No.	Details	Bill No.	Date	Amount
1.	Laptop - Lenovo:i3, 4GB DDR4, 1 TB Hard disk	A 0626	03/07/2017	35,490.00
2.	Printer- HP Multifunction Mono Laser	A 0626	03/07/2017	18,500.00
3.	Desktop - Lenovo: i5, 8GB DDR4, 1 TB Hard disk	A 0675	28/07/2017	60,000.00
4.	TP-LINK Universal Wireless Wi-Fi	S-413	12/02/2018	5000.00
	<b>Total</b>			<b>1,18,990.00</b>

  
Principal Investigator  
[A-JENIFER JOTHI MARY]

  
PRINCIPAL  
St. JOSEPH'S COLLEGE  
(AUTONOMOUS)  
TIRUCHIRAPPALLI 620 002



### 3. FIELD WORK & TRAVEL

Place Visited	Mode of Travel	Bill No.	Date of Travel		Amount (Rs. /-)
			From	To	
K. Ramakrishnan College, Trichy	Car	1	6/5/2017	6/5/2017	1100.00
Andhra University, Visakhapatnam	Train	39183442, 39183443, 39183444, 39183445, 39183446	7/8/2017	7/15/2017	2100.00
Adi Shankara Insitute of Enginerring and Technology , Kaladi, Kerala	Train	10000089768365, 10000089776628	8/11/2017	8/14/2017	1350.00
NIT College, Trichy	Car	2	8/29/2017	8/28/2017	1200.00
Jayaraj Annapackiam College for Women, Periyakulam	Car	3	9/14/2017	9/14/2017	1800.00
Chennai, Data Collection	Train	10000066319293	10/26/2017	10/28/2017	864.00
JCT Institutions Engineering & Polytechnic College, Coimbatore	Train	10000104377734, 10000104383905	11/3/2017	11/6/2017	990.00
Coimbatore, Data Collection	Train	10000105579542	11/23/2017	11/23/2017	175.00
Bangalore, Data Collection	Train	10000116471203	3/9/2018	3/9/2018	255.00
Uttaranchal University, Dehradun	Train	10000123284671	4/18/2018	4/23/2018	5020.00
NMC College, Trichy	Car	31	6/22/2018	6/22/2018	1700.00
				<b>Total</b>	<b>16,554.00</b>

*[Signature]*  
Principal Investigator

[A-JENIFER JOTHI MARY]




*[Signature]*  
**PRINCIPAL**  
**ST. JOSEPH'S COLLEGE**  
**(AUTONOMOUS)**  
**TIRUCHIRAPPALLI 620 032**



## 5. CONTINGENCY

	Details	Bill No.	Date	Amount
1	A to Z Paper & Stationeries	832	1/7/2017	489.00
2	Fine Rubber Stamp Marker	9556	4/7/2017	140.00
3	Sri Kumaran stores	6945	25/07/2017	218.00
4	Murugan paper mart	33AVCS0646R1Z4	14/08/2017	540.00
5	Citi Xerox	279	18/9/2017	2940.00
6	Sri kumaran stores	1572	9/10/2017	330.00
7	J.K. Systems	1089	30/10/2017	4457.00
8	Annai Xerox	547	21/11/2017	300.00
9	Grace systems	239	5/12/2017	1000.00
10	iMat computers	1355	4/1/2018	450.00
11	J.K. systems	s-418	12/2/2018	5000.00
12	Globus photos	697	28/02/2018	1315.00
13	Uniques systems	111	3/3/2018	750.00
14	Princy computers	322	15/04/2018	1000.00
15	Sri Kumaran Stores	5225	20/04/2018	250.00
16	Sri Kumaran Stores	8086	25/05/2018	365.00
17	Citi Xerox	2716	7/6/2018	140.00
18	Sri Kumaran Stores	4203	12/6/2018	360.00
19	P.R. & Sons	3015	23/11/2017	1200.00
<b>Total</b>				<b>21,244.00</b>

  
Principal Investigator

[A. JENIFER JOSHI MARY]



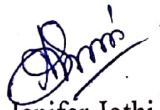
  
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ST. JOSEPH'S COLLEGE  
(AUTONOMOUS)  
TIRUCHIRAPPALLI 620 002



## 6. HIRING SERVICES

S. No.	Details	Bill No.	Date	Amount
1.	Website Designing	2708	26.02.2018	2000.00
2.	Website Development	2711	05.03.2018	4000.00
3.	Web Hosting	2712	05.03.2018	2000.00
4.	Internet Browsing	2713	05.02.2018	2000.00
	<b>Total</b>			<b>10,000.00</b>

the Expenditure incurred are according to the Terms and Conditions laid down for Minor Research Project the UGC.

  
(A. Jenifer Jothi Mary)

Signature of Principal Investigator

  
(Rev. Dr. M. Arockiasamy Xavier SJ)

Signature of the Principal

PRINCIPAL  
ST. JOSEPH'S COLLEGE  
(AUTONOMOUS)  
TIRUCHIRAPPALLI 620 002



**UNIVERSITY GRANTS COMMISSION  
BAHADUR SHAH ZAFAR MARG NEW  
DELHI – 110 002.**

**Final Report of the work done on the Minor Research Project**

Project report No. 1<sup>st</sup> /Final : Final Report  
 UGC Reference No. : F. MRP-6527/16 (SERO/UGC)  
 Period of report : From July 2017 to June 2019  
 Title of research project : Big Data analytics for aspect based sentiment analysis of students' opinion in digitalized higher education  
 (a) Name of the Principal Investigator : A. Jenifer Jothi Mary  
 (b) Deptt. : PG and Research Department of Computer Science,  
 (c) College where work has progressed : St. Joseph's College (Autonomous),  
 Tiruchirappalli – 620002,  
 Tamil Nadu, India.  
 Effective date of starting of the project : 1<sup>st</sup> July 2017  
 Grant approved and expenditure incurred during the period of the report:  
 a. Total amount approved Rs. : Rs. 1,93,990.00  
 b. Total expenditure Rs. : Rs. 1, 96,853.00  
 c. Report of the work done : Report enclosed  
 :

**Brief objective of the project**

- Adopting a new philosophy in motivating the students to create a digital India.
- Building an effective and productive education system with inculcation of ICT(Information and Communication Technology).
- Developing a communication strategy for designing curriculum by recognizing the stakeholders' views.
- Implementing supervisory teaching to raise effectiveness of higher education by developing the intellectual climate as per the needs of the stakeholders.
- Attempting to standardize the higher education by applying analytical methods.

i. Work done so far and results achieved and publications, if any, resulting from the work (Give details of the papers and names of the journals in which it has been published or accepted for publication)

- Enclosed as separate document (Work done)
- A. Jenifer Jothi Mary and Dr. L. Arockiam, "Jen-Ton: A Framework to enhance the Accuracy of



Aspect level Sentiment Analysis in Big Data", **IEEE Xplore** Compliant - Part Number: CFP17L34-ART, 2017, pp. 452-457, (ISBN: 978-1-5386-4031-9).

- **A. Jenifer Jothi Mary** and Dr. L. Arockiam, "Aspect based Parsing for Sentiment Analysis in Big Data", International Journal of Computer Science and Mobile Applications, Volume 5, Issue 12, 2017, pp. 1-7, (ISSN: 2321- 8363). (IF - 5.515) (**UGC Listed Journal**, Journal No.: 63603).
  - **A. Jenifer Jothi Mary** and Dr. L. Arockiam, "A Framework for Aspect Based Sentiment Analysis using Fuzzy Logic", ICTACT Journal on Soft Computing, Volume 08, Issue 02, January 2018, pp. 1611 – 1615, (ISSN: 2229-6956), DOI: 10.21917/ijsc.2017.02241611. (**Free Journal**)
  - **Jenifer Jothi Mary** and Dr. L. Arockiam, "Aspect Based Sentiment Analysis of Twitter Product Reviews Using Imputation of Missing Sentiment", Proceedings of International Conference on Advanced Techniques in Engineering, Science & Management (Advanced Techniques), International Organization of Scientific Research and Development (IOSRD) Bangalore, October 2017, pp. 35-41. (**UGC Listed and Scopus Indexed**)
  - **Jenifer Jothi Mary** and Dr. L. Arockiam, "FDSS: Fuzzy Based Decision Support System for Aspect Based Sentiment Analysis in Big Data", a book chapter in Advances in Computing and Data Sciences, October 2018, pp 77-87. (**Springer**)
- i. Has the progress been according to original plan of work and towards achieving the objective? if not, state reasons:

**The progress been according to original plan**

- v. Please indicate the difficulties, if any, experienced in implementing the project:

**-Nil-**

- If project has not been completed, please indicate the approximate time by which it is likely to be completed. A summary of the work done for the period (Annual basis) may please be sent to the Commission on a separate sheet:

**- N/A-**

- vi. If the project has been completed, please enclose a summary of the findings of the study. Two bound copies of the final report of work done may also be sent to the Commission:

**Status of the project – completed**

**Two bound copies of the final report of the work done is enclosed**

- ii. Any other information which would help in evaluation of work done on the project. At the completion of the project, the first report should indicate the output, such as (a) Manpower trained (b) Ph. D. awarded



(c) Publication of results (d) other impact, if any

- A M.Phil scholar and a group of PG students are trained in portal development and closely associated with data collection and analysis.
- A **Web developer** is hired for domain administration and website hosting services.
- **Four papers** are published in the International Journal (IEEE – 1, Scopus -1, UGC Listed-1 and Free journal-1)
- **One paper** been chaptered in the book: ADVANCES IN COMPUTING AND DATA SCIENCES, October 2018. (Springer)

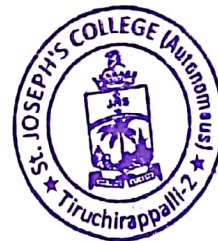
  
(A. Jenifer Jothi Mary)

SIGNATURE OF THE PRINCIPAL  
INVESTIGATOR

  
(Rev. Dr. M. Arockiasamy Xavier SJ)

PRINCIPAL

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TIRUCHIRAPPALLI 620 002



**UNIVERSITY GRANTS COMMISSION  
BAHADUR SHAH ZAFAR MARG  
NEW DELHI – 110 002**

**PROFORMA FOR SUBMISSION OF INFORMATION AT THE TIME OF SENDING THE  
FINAL REPORT OF THE WORK DONE ON THE PROJECT**

- |  |   |  |
|--|---|--|
| Title of the Project                           | : | BIG DATA ANALYTICS FOR ASPECT BASED SENTIMENT ANALYSIS OF STUDENTS' OPINION IN DIGITALIZED HIGHER EDUCATION  |
| NAME AND ADDRESS OF THE PRINCIPAL INVESTIGATOR | : | A. JENIFER JOTHI MARY<br>PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE,<br>ST. JOSEPH'S COLLEGE (AUTONOMOUS),<br>TIRUCHIRAPPALLI – 620002,<br>TAMIL NADU, INDIA.  |
| NAME AND ADDRESS OF THE INSTITUTION            | : | ST. JOSEPH'S COLLEGE (AUTONOMOUS),<br>TIRUCHIRAPPALLI – 620002,<br>TAMIL NADU, INDIA.  |
| UGC APPROVAL LETTER NO. AND DATE               | : | F. MRP-6527/16 (SERO/UGC), 30 JUNE 2017  |
| DATE OF IMPLEMENTATION                         | : | 1 <sup>ST</sup> JULY 2017  |
| TENURE OF THE PROJECT                          | : | FROM JULY 2017 TO JUNE 2019  |
| TOTAL GRANT ALLOCATED                          | : | RS. 2,53,990.00/-  |
| TOTAL GRANT RECEIVED                           | : | RS. 1,93,990.00/-  |
| FINAL EXPENDITURE                              | : | RS. 1,96,853.00/-  |
| TITLE OF THE PROJECT                           | : | BIG DATA ANALYTICS FOR ASPECT BASED SENTIMENT ANALYSIS OF STUDENTS' OPINION IN DIGITALIZED HIGHER EDUCATION  |
| 11. OBJECTIVES OF THE PROJECT                  | : | <ul style="list-style-type: none"> <li>➤ Adopting a new philosophy in motivating the students to create a digital India.</li> <li>➤ Building an effective and productive education system with inculcation of ICT(Information and Communication Technology).</li> <li>➤ Developing a communication strategy for designing curriculum by recognizing the stakeholders' views.</li> <li>➤ Implementing supervisory teaching to raise effectiveness of higher education by developing the intellectual climate as per the needs of the stakeholders.</li> <li>➤ Attempting to standardize the higher education by applying analytical methods.</li> </ul> |



12. WHETHER OBJECTIVES WERE ACHIEVED (Give Details) : The objectives of the study has been successfully completed (Enclosed)
13. ACHIEVEMENTS FROM THE PROJECT :
- A. Jenifer Jothi Mary and Dr. L. Arockiam, "Jen-Ton: A Framework to enhance the Accuracy of Aspect level Sentiment Analysis in Big Data", **IEEE Xplore** Compliant - Part Number: CFP17L34-ART, 2017, pp. 452-457, (ISBN: 978-1-5386-4031-9).
  - A. Jenifer Jothi Mary and Dr. L. Arockiam, "Aspect based Parsing for Sentiment Analysis in Big Data", International Journal of Computer Science and Mobile Applications, Volume 5, Issue 12, 2017, pp. 1-7, (ISSN: 2321- 8363). (IF - 5.515) (**UGC Listed Journal**, Journal No.: 63603).
  - A. Jenifer Jothi Mary and Dr. L. Arockiam, "A Framework for Aspect Based Sentiment Analysis using Fuzzy Logic", ICTACT Journal on Soft Computing, Volume 08, Issue 02, January 2018, pp. 1611 – 1615, (ISSN: 2229-6956), DOI: 10.21917/ijsc.2017.02241611. (**Free Journal**)
  - Jenifer Jothi Mary and Dr. L. Arockiam, "Aspect Based Sentiment Analysis of Twitter Product Reviews Using Imputation of Missing Sentiment", Proceedings of International Conference on Advanced Techniques in Engineering, Science & Management (Advanced Techniques), International Organization of Scientific Research and Development (IOSRD) Bangalore, October 2017, pp. 35-41. (**UGC Listed and Scopus Indexed**)
  - Jenifer Jothi Mary and Dr. L. Arockiam, "FDSS: Fuzzy Based Decision Support System for Aspect Based Sentiment Analysis in Big Data", a book chapter in Advances in Computing and Data Sciences, October 2018, pp 77-87. (**Springer**)
14. SUMMARY OF THE FINDINGS : Enclosed separately
15. CONTRIBUTION TO THE SOCIETY ( Give Details ) : The proposed Aspect Based Students' Opinion Analytical System aims at extracting the insights from students' opinion, which is posted through the internet. Students write feedback about the subject they study every semester on daily basis with day order and date details. It motivates the students to use the internet to express their opinions round the clock. Enhancing teaching and learning through educational data analytics is a value-added assessment. The processes of data assessment and analysis will enable the academia to measure, improve and compare the performance of individuals, programs, departments and institutions. This academic data analytics also help to predict students' academic difficulty, allowing faculty and



advisors to provide instructions tailored to specific learning needs. These mined data could support teaching and learning to provide customization, tutoring, or intervention within the learning environment. Thus, the proposed study uses the reviews and comments of the students and presents a system to predict students' progress and performance.

16. WHETHER ANY PH.D. : NO  
ENROLLED/PRODUCED OUT OF THE PROJECT
17. NO. OF PUBLICATIONS OUT OF THE : 5 – ENCLOSED  
PROJECT  
(PLEASE ATTACH)

  
(A. Jenifer Jothi Mary)

**SIGNATURE OF THE PRINCIPAL  
INVESTIGATOR**

  
(Rev. Dr. M. Arockiasamy Xavier SJ)

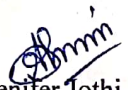
**PRINCIPAL**


**PRINCIPAL  
ST. JOSEPH'S COLLEGE  
(AUTONOMOUS)  
TIRUCHIRAPPALLI - 620 002**



## **Project Completion Certificate**

This is to certify that the Final Report (July 2017- June 2019) of the UGC Minor Research Project entitled **“Big Data analytics for aspect based sentiment analysis of students’ opinion in digitalized higher education”** (UGC Ref. No.:F. MRP-6527/16 (SERO/UGC) June- 2017) (Link No: 6517 Comcode: TNBD007 UniqueID: RHTSJC), carried out by A. Jenifer Jothi Mary, Assistant Professor, Department of Computer Science, St. Joseph’s College (Autonomous), Tiruchirappalli-620002, is uploaded into the college website ([www.sjctni.edu](http://www.sjctni.edu)) and also the hard copy is submitted to the library for reference.

  
(A. Jenifer Jothi Mary)  
Signature of the Principal Investigator

  
(Rev. Dr. M. Arockiasamy Xavier SJ)  
Head of the Institution

**PRINCIPAL  
ST. JOSEPH'S COLLEGE  
(AUTONOMOUS)  
TIRUCHIRAPPALLI 620 002**





**UNIVERSITY GRANTS COMMISSION**  
**BAHADUR SHAH ZAFAR MARG, NEW DELHI-110002**

**ACCESSION CERTIFICATE**

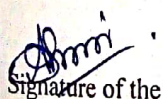
This is to certify that A. Jenifer Jothi Mary, Dept. of Computer Science, St. Joseph's College (Autonomous), Tiruchirappalli-620002 .MRP -6527/16 (SERO/UGC) June - 2017 (Link No.:6527 Comcode: TNBD007 UniqueID: RHTSJC) has handed over the following books and Journals purchased under the scheme of minor Research Project to the Library of St. Joseph's College(Autonomous), Tiruchirappalli-620002.

S.No	Name of the Books Purchased	Bill Nos	Date	Amount (Rs.)	Acc.No.
1.	Sentiment analysis, B2A UK Cambridge university press (Amazon), Chennai.	500720	23/08/2017	4323.00	178186
2.	Learning social media analytics with R, Repro Knowledgecast (amazon), Mumbai.	QWCA-51108	25/08/2017	849.00	178187
3.	Machine learning for big data developers and technical professional, JBCPD (Amazon), Tamilnadu.	MAA4-86843	25/08/2017	540.00	178188
4.	Big data, data mining and machine learning, Prakash eSolutions (Amazon), Tamilnadu.	MAA4-78530	25/08/2017	560.00	178189
5.	Machine learning in python, Vikas Book House (Amazon), Pune.	SPNA-65070	25/08/2017	443.00	178190
6.	Problem solving and python programming, PR & SONS, Tamilnadu.	4017	30/08/2017	260.00	178191
7.	Python social media analytics, Repro Knowledgecast (amazon), Mumbai.	QWCA-117877	29/10/2017	898.00	178192
8.	Big data, black book: covers Hadoop 2, MapReduce, hive, yarn, pig, R and data visualization, JBCPD (AMAZON), Tamilnadu.	MAA4-201766	29/10/2017	597.00	178193
9.	Hadoop 2 quick start guide: Learn the essentials of big data computing in the Apache Hadoop 2 ecosystem, USB Publishers (Amazon), Tamilnadu	MAA4-144111	16/11/2017	303.00	178194
10.	Introducing data science: Big data, machine learning and more, using python tools, USB Publishers (Amazon), Tamilnadu	MAA4-144111	16/11/2017	599.00	178195
11.	Big data fundamentals: concepts drivers: concepts, drivers and techniques, Prakash eSolutions, Gurganon.	DEL4-393181	16/11/2017	231.00	178196
12.	How to Write and Publish a Scientific Paper, 8th Repro Knowledgecast Ltd., Mumbai.	BOM1-1702	11/12/2017	2817.00	178197
13.	Analytics in a big data world: the essential guide to data science and its applications, USB Publishers, Tamilnadu.	MAA4-186699	21/12/2017	559.00	178198
14.	Core python programming, Mittal books, Gurganon.	DEL4-600771	29/01/2018	514.00	178199
15.	Analytics: data science, data analysis and predictive analytics for business, Prakash eSolutions, Gurgaon.	DEL4-6095587	29/01/2018	988.00	178200
16.	Big data and Hadoop, Khanna Book Publishing company private limited, Delhi.	IN-465	29/01/2018	510.00	178201
17.	Hands-on machine learning with scikit-learn and tensorflow: concepts, tools, and techniques to build intelligent systems, Shroff Publishers, Maharashtra.	BOM4-24860	29/01/2018	1475.00	178202
18.	Hands-on programming with R, Shroff Publishers, Maharashtra.	BOM4-24860	29/01/2018	550.00	178203
19.	Hadoop: the definitive guide, Shroff Publishers, Maharashtra.	BOM4-24860	29/01/2018	950.00	178204



**UNIVERSITY GRANTS COMMISSION**  
**BAHADUR SHAH ZAFAR MARG, NEW DELHI-110002**

20.	Learning Spark: Lightning-fast big data analysis, Shroff Publishers, Maharashtra.	BOM4-24860	29/01/2018	500.00	178205
21.	Hands-On Programming with R, Shroff Publishers, Maharashtra.	BOM4-112451	12/02/2018	650.00	178206
22.	Data Science From Scratch: First Principles with Python, Infinity Books- Fast Delivery, Maharashtra.	405-5874654-7895147	25/02/2018	575.00	178207
23.	Big Data and Analytics, STUDENT BOOK STALL V.V.NAGAR.	405-9473648-1741958	20/02/2018	588.00	178208
24.	Programming and Problem Solving with Python, Ashok Namdev Kamthane, BOOKS & EQUIPMENT DISTRIBUTORS	405-3836647-6147529	28/3/2018	439.00	178209
25.	Research Methodology : Methods And Techniques, Cloudtail India Private Limited, Tamilnadu.	405-3085282-8989920	28/3/2018	419.00	178210
26.	Deep learning for beginners: concepts and algorithms, Atlantic Publishers, Delhi.	In-10641	12/5/2018	1322.00	178211
27.	Statistics for data science, Repro Knowledgecast, Maharashtra.	QWCA-218299	25/05/2018	718.00	178212
28.	Principles of data science, RLBD-ON-WEB, Hyderabad.	HYD8-782	25/05/2018	799.00	178213
29.	Principles of soft computing, Prakash eSolutions, Karnataka.	QSHS-221381	25/05/2018	577.00	178214
30.	Internt of Things, Mittal Books, Karnataka.	QSHS-255981	25/05/2018	540.00	178215
31.	Data science algorithms in a week, SansRack Publishing Solutions, Tamilnadu.	QSIW-6860	28/05/2018	719.00	178216
32.	Data science and big data analytics: Discovering, analyzing, visulalizing and presenting data, Repro Knowledgecast, Maharashtra.	BOM3-234504	28/05/2018	1439.00	178217
33.	Big data analytics for cloud, IoT, and cognitive computing, UBSPD (Amazon), Tamilnadu.	MAA4-198562	25/05/2018	559.00	178218
34.	R for everyone: advanced analytics and graphics, Mittal books (Amazon), Karnataka.	QWRE-142542	25/05/2018	649.00	178219
35.	Data smart: Using data science to transform information into insight, Repro Books-on-Demand (Amazon), Maharashtra.	BOM3-345267	25/05/2018	679.00	178220
36.	Practical statistics for data scientists: 50 essential concepts, Shroff Publishers (Amazon), Thane.	BOM4-132414	25/05/2018	925.00	178221
Total				30065.00	

  
Signature of the

Principal Investigator

[A.JENIFER JOTHIMARY]

  
Signature of the

Librarian

**Dr. M. DORAIRAJAN**  
LIBRARIAN

Joseph's College (Autonomous)  
Tiruchirappalli-620 002.

  
Signature of the

Principal

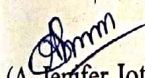
**PRINCIPAL**  
**ST. JOSEPH'S COLLEGE**  
**(AUTONOMOUS)**  
**TIRUCHIRAPPALLI 620 002**

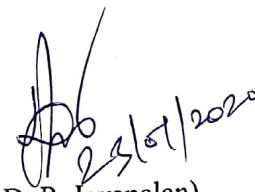



## Asset Certificate

This is to certify that **A. Jenifer Jothi Mary, St. Joseph's College (Autonomous), Tiruchirappalli-620002 (Link No.:6527 Comcode:TNBD007 UniqueID: RHTSJC)** has handed over the following equipment purchased under the UGC Minor Research Project to the college:-

1. Laptop- Lenovo:i3, 4GB DDR4, 1 TB Hard disk (no. 1)
2. Printer- HP Multifunction Mono Laser (no. 1)
3. Desktop - Lenovo: i5, 8GB DDR4, 1 TB Hard disk (no. 1)
4. TP-LINK Universal Wireless Wi-Fi (no. 1)

  
(A. Jenifer Jothi Mary)  
Principal Investigator

  
(Dr. D. P. Jeyapalan)  
Head of the Department  
Head of the Department  
Department of Computer Science  
St. Joseph's College (Autonomous)  
Tiruchirappalli-620 002

  
(Rev. Dr. M. Arockiasamy Xavier SJ)  
Head of the Institution  
PRINCIPAL  
ST. JOSEPH'S COLLEGE  
(AUTONOMOUS)  
TIRUCHIRAPPALLI 620 002





## **FINAL REPORT OF THE WORK DONE**

**Title of the Project: Big Data Analytics for Aspect Based Sentiment Analysis of Students' Opinion in Digitalized Higher Education**

**( UGC Reference No. : F. MRP- 6527/16 (SERO /UGC) June -2017)**

### **1. Introduction**

Higher education plays a vital role in building the nation. Quality in higher education can be affirmed in terms of satisfaction level of students and teachers, and other stakeholders. Quality teaching uses pedagogical techniques to produce learning outcomes for students. It involves several dimensions, including the effective design of curriculum and course content, a variety of learning contexts (guided independent study, project-based learning, collaborative learning, experimentation, etc.), soliciting and using feedback, and effective assessment of learning outcomes. Students' evaluation is one of the wide ranges of activities that will improve the quality of the teaching –learning process.

The teaching-learning is a student-centered process. But, the students normally inhibited to express their opinions to the teachers regarding teaching methods and their level of understanding during class hours. They feel free to share their observations and views in social media sites such as Twitter, YouTube, Facebook, Forums or blogs etc., on any subjects or teachers with their friends. This kind of information from social media is a great source to understand their mind-set, attitudes and concerns about a subject and teaching-learning process adopted. But, accumulating and examining this kind of social media data is a challenging task. Here, sentiment analysis can be used to identify the students' attitudes towards teaching-learning process.

### **2. Review of the Literature**

Nabeela Altrabsheh et al.[1] introduced an architecture for Sentiment Analysis in Education (SA-E). Different methods were used to collect the feedback which helps to identify the student's attitudes/opinions towards the teachers. They compared with previous feedback systems which provide the limited amount of text as feedback such as clickers, SMS and Mobile Phones. Pallavi K. Pagare[3] Proposed to develop a workflow for both qualitative inquiry and



large-scale data mining. It focused on engineering student's Twitter posts to know the problems and difficulties like heavy learning load, lack of social meeting, and sleep deficiency in educational practices. This study presents an insight into student's incident by applying multi-label classification and decision tree algorithm. To get accurate result, this was compared with other generic algorithms.

N. D. Valakunde et al. [4] presented a concept paper on multi-aspect and multi-class document classification for various levels of SA. They have verified faculty performance on aspect based sentiment scores, like knowledge, presentation, communication and regularity. These aspects were taken from the NAAC accreditation criteria. They have experimented with the dataset of 8 years students' feedback which is not about the particular students or subject and not in real situation.

Sheetal R. Patodiya et al. [6] proposed multi-label Naïve Bayes algorithm in order to classify the various aspects by analyzing the students' opinion from social media. This has included with multiple languages and images to improve the probability of sentences of other aspects. This has extracted the positive way of taking education and the benefits of education. Zied Kechaou et al. [10] proposed and applied the combined HMM and SVM to classify the users' opinion to extract the useful information from the users' feedback which is posted in the social networks. They applied only 20% of the data as testing data and the remaining as training data. They did not discuss pre-processing to remove the noisy text.

### 3. Objectives

The proposed study aims to bestow quality enhancement in higher education. The objectives of the project are as follows:

- An effective and productive education system is build with inculcation of ICT.
- Developing a communication strategy for designing curriculum.
- To know the student's views, feelings, comments, mind-setup towards their course and subject.
- Attempting to standardize the higher education by applying analytical methods

#### 4. Methodology

The goal of this project work is to identify the student's mind-set towards the teacher and their teaching using an **Aspect Based Students' Opinion Analytical System**. Sentiment Analysis is helpful in extracting knowledge from the unstructured students' feedback for the improvement of teaching and learning process. It makes it easy to know the opinions of the learners through an automated system. By this proposed Opinion Analytical System, the analyst can recommend modifications in courses content and methodologies used in teaching. The proposed system is working in three phases namely data collection, data storage and data analytics. It plays an important role in collecting and analysing the students' feedback. The phases in the proposed Aspect Based Students' Opinion Analytical System are presented in Fig. 1.

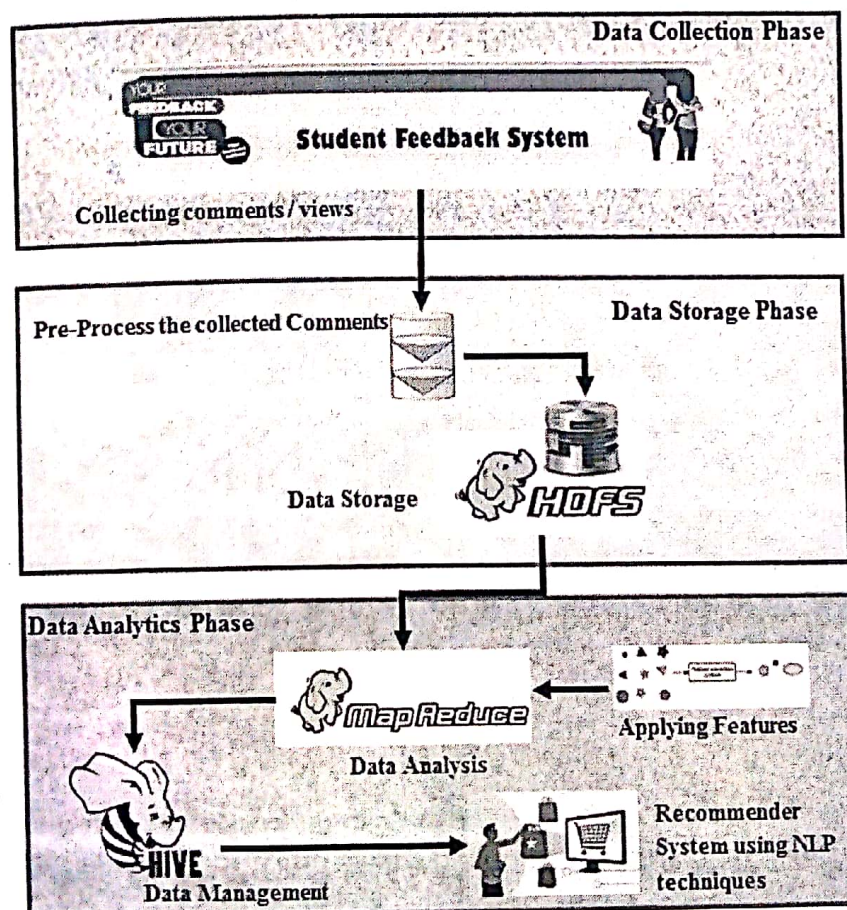


Fig. 1 Methodological diagram for Aspect based students' opinion analytical system

In the first phase, data collection is done through student feedback web portal. The collected data are pre-processed for removing the stopwords, extracting the



sentiment/opinionated text, extracting the aspects of the comments and the cleaned data are stored.

Since, the students' feedback is huge in volume and of different variety, the HDFS is used for storing the collected data. This is handled in Phase II – Data Storage Phase. The data stored in the HDFS were analyzed to establish association between the factors such as teachers' Clarity in subject, answering queries of the students, students' level of understanding the subject etc., with teaching techniques.

The third phase of the proposed system deals with a recommender system where the decisions are taken based on NLP techniques with respect to teaching methodology, Syllabus, course curriculum etc.

## **5. Work Completed**

### **5.1 Sample selection for Data Collection**

The proposed project is intended to be implemented in the host department of the St. Joseph's College (Autonomous), Tiruchirappalli. St. Joseph's College has always upheld and radiated Goodness and Truth in its endeavour to impart quality in higher education. It has been instrumental in churning out thousands of truly educated persons, physically fit and intellectually well equipped. Thus, this College stands for what is best in education. The Department of Computer Science of St. Joseph's College was started in the year 1983, offers B.Sc. (Computer Science), MCA, M.Phil. and Ph.D. programmes. The students strength of the department of Computer Science in the academic year (2017-18) was 496. The proposed study considers II B.Sc, III B.Sc, I MCA, and II MCA students only. As the I B.Sc students were new to the college environment and the III MCA students had gone for their industrial projects, they were not considered for data collection. So, the total students' strength was 345. The students' details, timetable of each faculty members and subject's details were already fed into the system and the students were asked to post their comments at any time. The data were collected from January 2018 to April 2018.



## 5.2 Phase I:

### a) Creation of a portal – for collecting student's feedback (1-2 months)

A student feedback portal is created with the following server configuration.

**Server:** Apache/2.4.18

**Web PortalAddress:** <http://www.studentfeedbackportal.tk/>

The Web portal is depicted in Fig. 2.

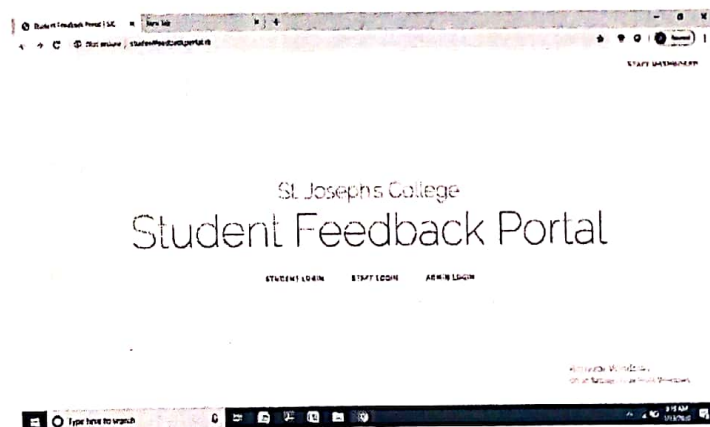


Fig. 2.The Web portal

The users of the portal are Administrator, staff and students. The Administrator has to register staff and students' details to facilitate them to login into the portal. He is also responsible for updating departments, classes, subjects' details and time table of the semester. Once the registration gets over, the users are given provisions for login. If the user is a staff, then they can view the subject wise feedback. If the user is a student, they have to login into the system to post the feedback by selecting the date and the subject according to the day order as the time table is mapped with the class and day order. Student can view the posted comment in their page itself. The screenshot of the Student Feedback Portal is presented in fig. 3.

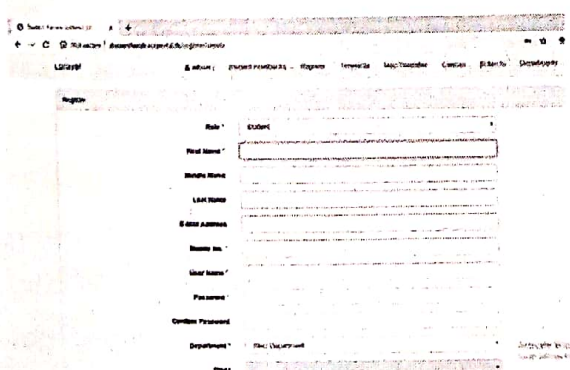


Fig. 3.a User Registration page

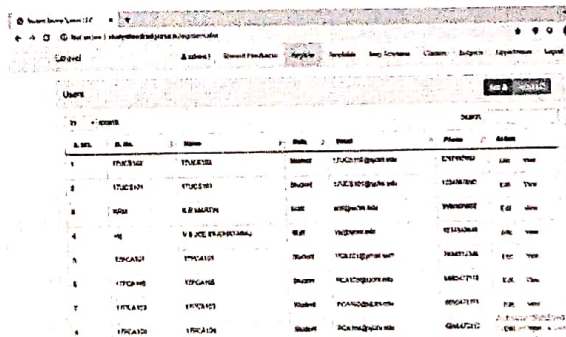


Fig. 3.b Registered Users page





### 5.4 Phase III: Implementation and Evaluation of project (16-24 months)

#### Evaluation of collected data sets

After data storage at HDFS, they are analyzed using statistical approaches at Department level. Analysis is performed by classifying teaching and learning into teaching strategies, Student engagement, learning difficulties, teaching pedagogy, use of ICT tools and other strategies like curriculum Design and student character formation. The graphical representation of the dataset is presented in Fig. 4

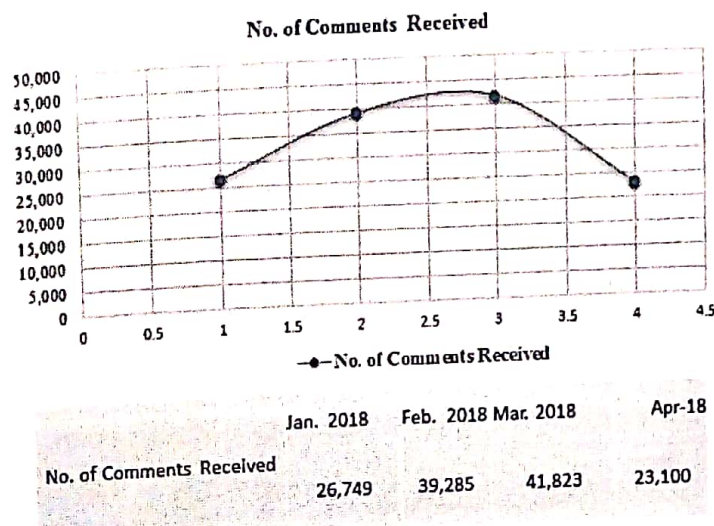
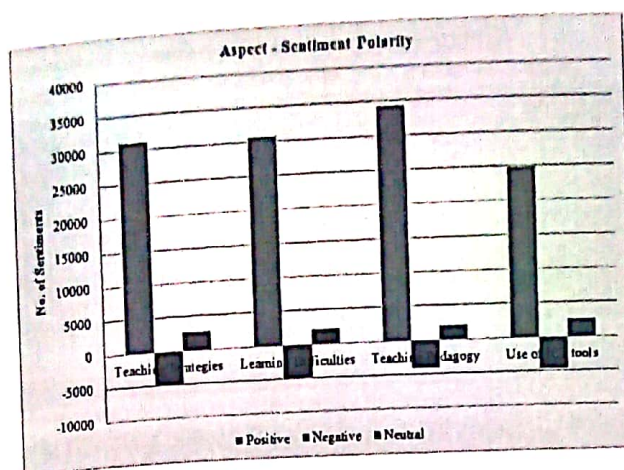


Fig 4. Graphical representation of the Dataset

## 6. Result and Discussion

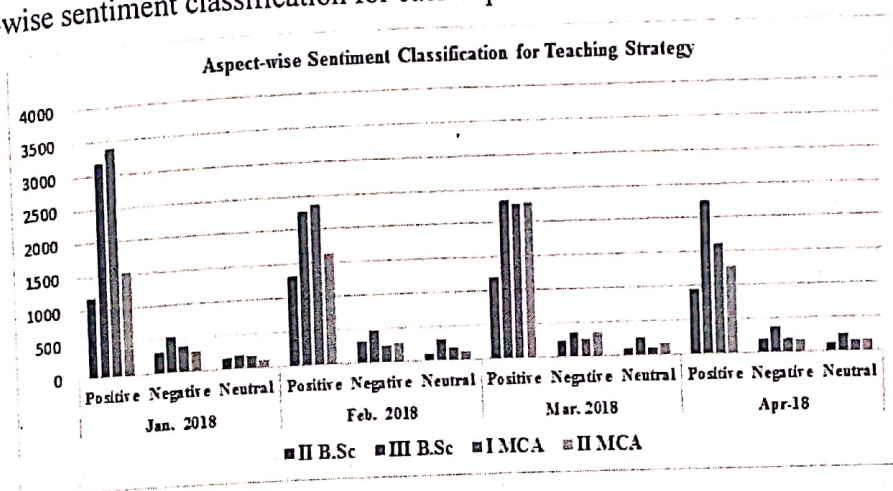
### a. Aspect based analysis

For the better understanding of the students' mind set, the polarity (positive, negative or neutral) of the students' opinion was calculated for the aspects such as teaching strategies, learning difficulties, teaching pedagogy and use of ICT tools and shown in Fig. 5.

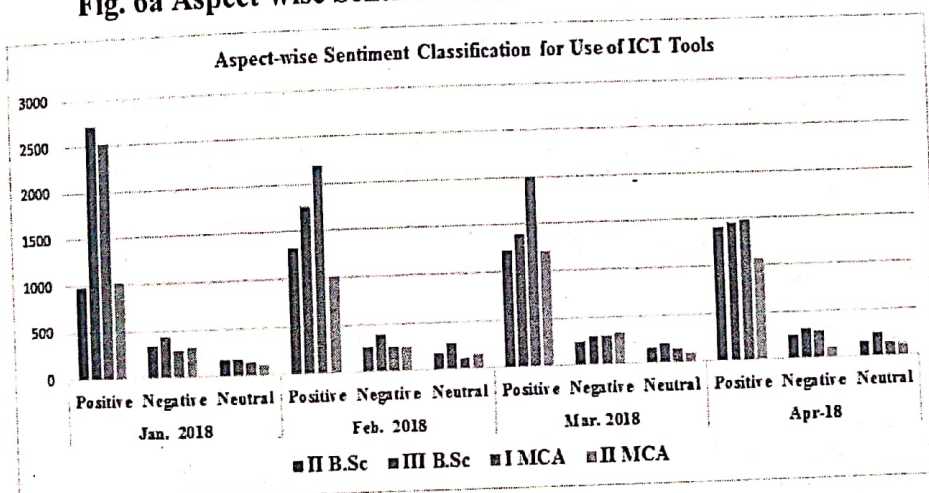


**Fig 5. Aspect Sentiment Polarity**

This analysis will help the management and the educationalist to improve the teaching strategies of the institution and help them to understand the learning difficulties of the students. The aspect-wise sentiment classification for each aspect is done and depicted in fig. 6.



**Fig. 6a Aspect-wise Sentiment Classification for Teaching Strategy**



**Fig. 6b Aspect-wise Sentiment Classification for Use of ICT Tools**



(ii). Development of the Recommender System (Asp-Recmd)

There are three steps involved in the Development of the proposed recommender system (Asp-Recmd). They are explained below.

Step 1: Design of Machine Learning Rules

The aspects Teaching Strategies, Learning Difficulties and Use of ICT tools were considered to design the rule for machine learning process. The sample rules are given in Table

1.

Table 1 Sample Rules for Machine Learning Process

Teaching Strategies	Learning Difficulties	Use of ICT tools	Decision
Low	Low	Low	STRONG_NEGATIVE
Low	High	Low	NEGATIVE
Low	Medium	Medium	NEGATIVE
Low	High	High	POSITIVE
Medium	Low	Low	STRONG_NEGATIVE
Medium	Medium	Low	NEGATIVE
Medium	High	Low	MEDIUM
Medium	High	Medium	POSITIVE
High	Low	Low	NEGATIVE
High	Medium	Low	MEDIUM
High	High	Low	POSITIVE
High	High	Medium	STRONG_POSITIVE
High	High	High	STRONG_POSITIVE

## Step 2: Creation of Membership Function

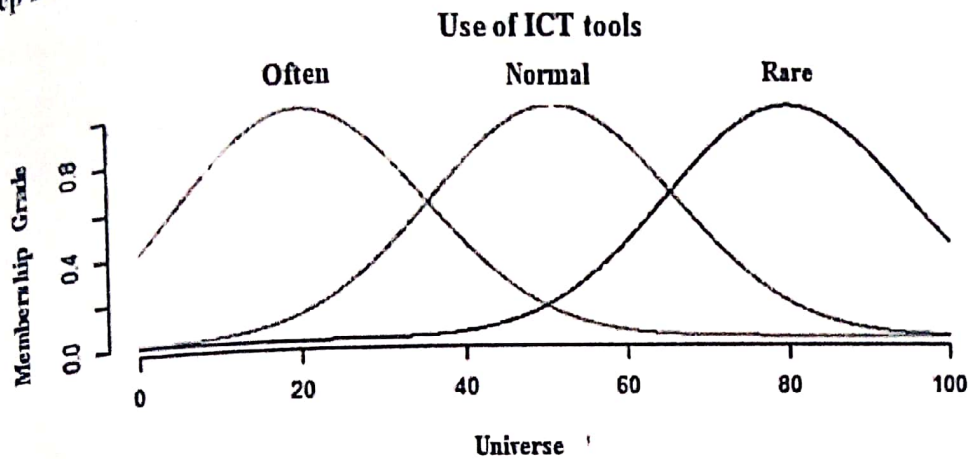


Fig. 7.a Membership function for the linguistic variable "Use of ICT tools"

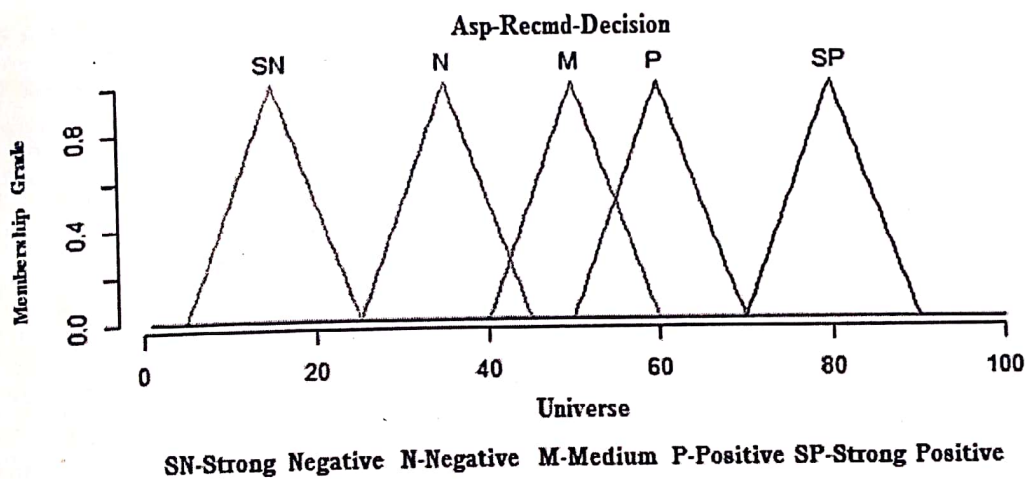


Fig 7.b Membership function for the linguistic variable "Asp-Recmd-Decision"

## Step 3: Decision Making and Recommendation

The proposed recommender System (Asp-Recmd) received its input for the membership variables Teaching Strategies, Learning Difficulties and Use of ICT tools from the aspect-wise sentiment classification. Sample recommendations made by the Asp-Recmd system is presented below.

Case 1: if Teaching Strategies= 30, Learning Difficulties= 30, Use of ICT tools = 30 then the recommendations suggested by the Asp-Recmd system is Strong Negative and the same is presented in Fig. 8a. This means that particular professor have very less teaching capacity, used



ICT tools very occasionally in teaching and the students' find difficulties in learning the particular subject.

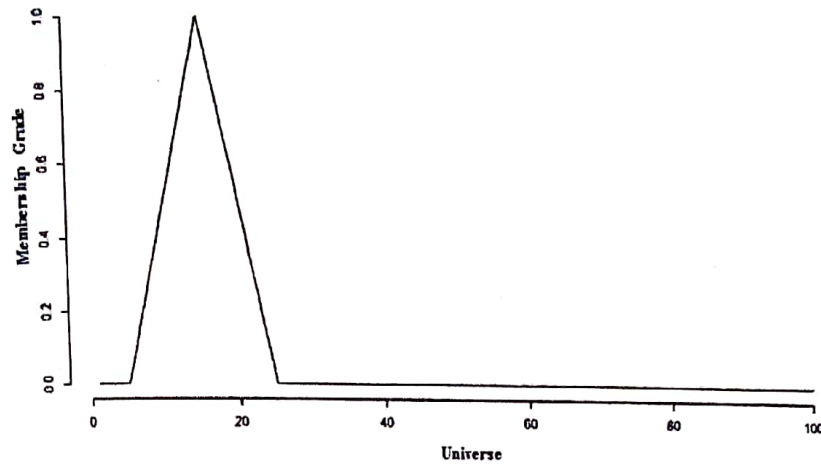


Fig. 8 a. Recommendation for Teaching Strategies = 30, Learning Difficulties = 30,  
Use of ICT tools = 30

Case 2: if Teaching Strategies = 70, Learning Difficulties = 70, Use of ICT tools = 70 then the recommendations suggested by the Asp-Recmd system was **Moderate** and is presented in Fig. 8b. This means that particular professor have moderate teaching capacity, used ICT tools quite often in teaching and students understand the subject clearly.

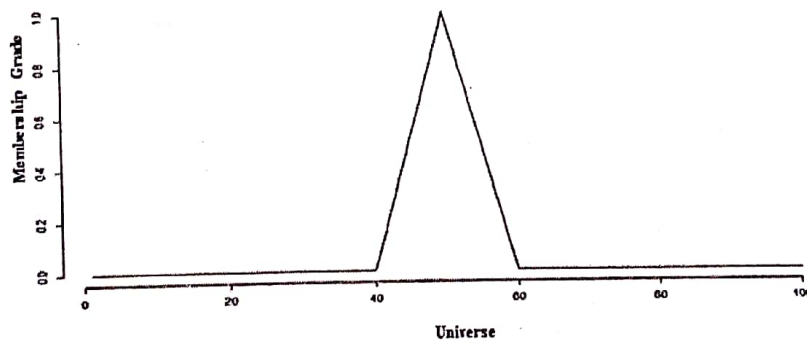


Fig. 8 b. Recommendation for Teaching Strategies = 70, Learning Difficulties = 70,  
Use of ICT tools = 70

The experiments showed that the recommender system (Asp\_Recmd) system works well and suggests recommendations correctly. The overall summary of the report has been presented in the table 1.

Table I Summary of the Report

Phase I	Creation of a portal – for collecting student's feedback	1-2 Months	Completed
	Creation of Experimental set-up with Hadoop ecosystem	3-5 Months	
Phase II	Feedback generation by Students' and collecting it	6-11 Months	Completed
	Pre-processing the collected data and developing a Recommender system with ML and NLP algorithms	12-15 Months	
Phase III	Implementation of the Recommender system with test data sets and generation of Recommendation	16-19 Months	Completed
	Evaluation of the project and presentation of the Report	20-24 Months	

## 7. Conclusion and Further Work to be done:

A novel approach is implemented for extracting knowledge from the unstructured students' feedback to improve the teaching and learning process. It has three well defined phases with defined functionalities. Sample data collection is done from the students of our college from Computer science department through a web portal. Pre-processing algorithms are used before storing the collected data in the HDFS system. The proposed recommender system **Asp-Recmd** was designed and the data set was trained using Fuzzy sets algorithms. The test analysis was also carried out on the collected data set and results were presented. In future, this portal is updated for all the departments of the college and modernized as mobile application to recommend the changes need for the stakeholders of the institution.





International Organization of Scientific Research and Development  
International Conferences

18<sup>th</sup> International Conference on  
Advanced Techniques in Engineering,  
Science & Management  
06 & 07 October 2017, Bangalore, India

## CERTIFICATE OF PARTICIPATION

This is to certify that

**Ms. A. JENIFER JOTHI MARY,**  
ASSISTANT PROFESSOR, ST. JOSEPH'S COLLEGE,  
TAMIL NADU, INDIA

**HAS PARTICIPATED AND PRESENTED A PAPER ENTITLED**  
**1975: ASPECT BASED SENTIMENT ANALYSIS OF TWITTER PRODUCT REVIEWS USING**  
**IMPUTATION OF MISSING SENTIMENT**

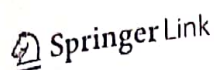
In 18<sup>th</sup> International Conference on Advanced Techniques in Engineering, Science & Management held on 06 & 07 October 2017, at Bangalore, India, Organized by International Organization of Scientific Research and Development.

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CONFERENCE CHAIR



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ORGANISING CHAIR

1/23/2020



# FDSS: Fuzzy Based Decision Support System for Aspect Based Sentiment Analysis in Big Data

International Conference on Advances in Computing and Data Sciences

ICACDS 2018: Advances in Computing and Data Sciences pp 77-87 | Cite as

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- L. Arockiam (1)

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Conference paper

First Online: 26 October 2018

- 415 Downloads

Part of the Communications in Computer and Information Science book series (CCIS, volume 906)

## Abstract

Sentiment analysis (SA) is an pioneering computing technology to advance the decision making process. Social media is used to bind the people by sharing their opinions. Opinion is in the free form of reviews or comments on micro-blogging sites such as online discussion forums, Twitter, Facebook and other different types of social networking sites. Fuzzy logic is one of the multi-valued logic. It considers the reasoning which is closer to the actual in lieu with fixed and exact. This research integrates fuzzy system to make business decisions in the proposed Fuzzy based Decision Support System (FDSS). The FDSS system uses the results of the analysis of the online sentiments and makes decisions based on some fuzzy rules. The fuzzy rules are defined to aid in the decision making process by classifying the sentiments of the aspects of a product. The Twitter mobile product dataset is used for experimental analysis and results show that the proposed FDSS system produces better results for decision making.

## Keywords

Sentiment analysis Opinion Fuzzy logic Fuzzy rules Non-opinionated sentences Big data  
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## References

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[CrossRef](https://doi.org/10.1016/S0898-1221(99)00056-5) ([https://doi.org/10.1016/S0898-1221\(99\)00056-5](https://doi.org/10.1016/S0898-1221(99)00056-5))  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Soft%20set%20theory%20%94first%20results&author=D.%20Molodtsov&journal=Comput.%20Math.%20Appl.&volume=37&issue=4&E2%80%9335&pages=19-31&publication_year=1999) ([http://scholar.google.com/scholar\\_lookup?title=Soft%20set%20theory%20%94first%20results&author=D.%20Molodtsov&journal=Comput.%20Math.%20Appl.&volume=37&issue=4&E2%80%9335&pages=19-31&publication\\_year=1999](http://scholar.google.com/scholar_lookup?title=Soft%20set%20theory%20%94first%20results&author=D.%20Molodtsov&journal=Comput.%20Math.%20Appl.&volume=37&issue=4&E2%80%9335&pages=19-31&publication_year=1999))
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[zbMATH](http://www.emis.de/MATH-item?1004.03042) (<http://www.emis.de/MATH-item?1004.03042>)  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Intuitionistic%20fuzzy%20soft%20sets&author=PK.%20Maji&author=R.%20Biswas&author=AR.%20Roy&journal=J.%20Fuzzy%20Math.&volume=9&issue=3&pages=677-692&publication_year=2001) ([http://scholar.google.com/scholar\\_lookup?title=Intuitionistic%20fuzzy%20soft%20sets&author=PK.%20Maji&author=R.%20Biswas&author=AR.%20Roy&journal=J.%20Fuzzy%20Math.&volume=9&issue=3&pages=677-692&publication\\_year=2001](http://scholar.google.com/scholar_lookup?title=Intuitionistic%20fuzzy%20soft%20sets&author=PK.%20Maji&author=R.%20Biswas&author=AR.%20Roy&journal=J.%20Fuzzy%20Math.&volume=9&issue=3&pages=677-692&publication_year=2001))
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A/c Dy No. 446  
Date: 29/6/17

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Phones: 040 - 23204735, 23200208 FAX: 040 - 23204734, Website: [www.ugc.ac.in](http://www.ugc.ac.in), email: [ugcsero@gmail.com](mailto:ugcsero@gmail.com)

No.F MRP-6527/16 (SERO/UGC)

Link No:6527.

June,2017

The Accounts Officer  
UGC-SERO, Hyderabad

Comcode: TNBD007  
UniqueID:RHTSJC

30 JUN 2017

Sub: Release of Grants-in-aid to Minor Research Projects for the year 2017-2018.  
Sir / Madam,

The has reference to the Minor Research Project proposal submitted by A. Jenifer Jothi Mary Department of Computer Science of "St. Joseph's College (Autonomous)" TIRUCHIRAPPALLI, TIRUCHIRAPPALLI entitled "BIG DATA ANALYTICS FOR ASPECT BASED SENTIMENT ANALYSIS OF STUDENTS" OPINION IN DIGITALIZED HIGHER EDUCATION". The subject expert, who evaluated the proposal, has recommended for financial assistance as detailed below.

Sl. No	Item	Amount Allocated (Rs.)	Amount Sanctioned as first installment (Rs.)
1.	Books & Journals	30000.	30000.
2.	Equipment	118990.	118990.
	Total	148990.	148990.
3.	Field work & Travel	30000.	15000.
4.	Chemical & Glass Ware	0 0	0 0
5.	Contingency (incl. Special Needs)	40000.	20000.
6.	Hiring Services	20000.	10000.
	Total	90000.	45000.
	Grand Total	238990.	193990.

- I am further to convey the sanction of the University Grants Commission to the payment of Rs.193990. to the principal, St. Joseph's College (Autonomous), TIRUCHIRAPPALLI, TIRUCHIRAPPALLI as first installment (100% Non-Recurring and 50% Recurring grants) towards the above project.


Amount Sanctioned	Head of Accounts	Category
Rs. 148990.	35-CAP-MRP(50)-3(A)2202.03.102.02.01	GEN
Rs. 45000.	31-GIA-MRP(50)-3(A)2202.03.102.02.01	GEN

- The above approval is subject to the general conditions of grants prescribed by the UGC for this scheme.
- The sanctioned amount is debit to the Head of Accounts 35-CAP-MRP(50)-3(A)2202.03.102.02.01. (General), 31-GIA-MRP(50)-3(A)2202.03.102.02.01(General) and is valid for payment during the financial year 2017-18 only and the amount of the Grant shall be drawn by the Accounts Officer (Drawing and Disbursing-Officer) UGC-SERO, Hyd. on the Grants-In Aid Bill and shall be disbursed to and credited to "The Principal, St. Joseph's College (Autonomous), TIRUCHIRAPPALLI, TIRUCHIRAPPALLI by Electronic Mode through PFMS Portal at the following details: (a) Name & Address of Account Holder: The Principal, St. Joseph's College (Autonomous), TIRUCHIRAPPALLI, TIRUCHIRAPPALLI (b) Account No: 137501000020012 (c) Name & Address of Bank Branch: IOB, CHINTHAMAN (d) IFSC Code: IOBA0001375.
- In case the Principal investigator is having ongoing Major/Minor Research Project OR has been transferred/left/retired from the college, the released amount of Rs.193990.-/ may be returned to UGC-SERO, Hyderabad immediately, failing which action will be initiated against the College for not adhering with the norms of UGC for the scheme.
- The grantee institution shall ensure the utilization of grants -in-aid for which it is being sanctioned/paid. in case of non-utilization-/part utilization, interest @ -10% per annum as amended from time to time on utilized amount from the date of drawl to the date of refund as per provision contained in General Financial Rules of Govt. of India will be charged.
- The assets acquired wholly or substantially out of UGC's grants shall not be disposed or encumbered or utilized for the purposes other than those for which the grant was given, without proper sanction of the UGC and should, at any time the college ceased to function, such assets shall revert to the UGC.



7. The Principal investigator of the project is required to submit the First year progress report of the work done along with documents 1) Annual Report of the Project as per Annexure-III 2) Utilization Certificate duly signed by the Principal Investigator, Principal & Chartered Accountant 3) Statement of Expenditure for the approved heads for the sanctioned amount as per Annexure-V duly signed by the Principal Investigator, Principal & Chartered Accountant.
8. The interest earned by the College / Institute on this grants-in-aid shall be treated as additional grant which may be shown in the Utilization Certificate / Statement of Expenditure to be furnished by the grantee institution.
9. The college has to send the filled in Acceptance certificate within 15 days of receipt of this letter, else the college will return back the sanctioned amount to this office. Further if the conditions of the acceptance letter is not acceptable, applicable to the P.I/College, the sanctioned amount be refunded back to SERO-UGC, Hyderabad.
10. The guidelines of Minor Research Project have to be followed in toto.
11. The Grant is subject to the adjustment on the basis of Utilization Certificate in the prescribed proforma submitted by the University/Institution.
12. The University/Institution shall maintain proper accounts of the expenditure out of the Grants, which shall be utilized only on the approved items of expenditure.
13. The Utilization Certificate to the effect that the grant has been utilized for the purpose for which it has been sanctioned shall be furnished to UGC as early as possible after the close of current financial year.
14. The college shall maintain a Register of Assets acquired wholly or substantially out of the grant in the prescribed proforma.
15. The College shall fully implement to Official languages Policy of Union Govt. and comply with the Official Language Policy, 1963 and Official languages (use for official purposes of the Union) Rules, 1976 etc.,
16. The approval for the above has been received vide letter No.F.7-3/2016(SERO/MRP/RO) dated 6<sup>th</sup> September, 2016 from UGC, New Delhi.

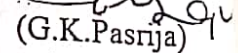
Yours faithfully

  
 (Dr. G. Srinivas)  
 Joint Secretary  
 30/06/17

Copy to:

1. The Principal (Along with DD / Funds transferred through E-mode)  
 St. Joseph's College (Autonomous)  
 TIRUCHIRAPPALLI, TIRUCHIRAPPALLI - 620002.
2. A. Jennifer Jothi Mary  
 Dept. of Computer Science  
 St. Joseph's College (Autonomous)  
 TIRUCHIRAPPALLI, TIRUCHIRAPPALLI - 620002.
3. The Dean/Director, College Development Council of affiliating University
4. The Commissioner /Director Collegiate Education, Government of TAMIL NADU
5. The Principal Accounts General (A & E)-  
 Government of TAMIL NADU

GAR Cap. Sl.No.151. /2017-2018  
 GAR GIA Sl.No.299. /2017-2018

  
 (G.K. Pasrija)  
 Under Secretary

The sanctioned grant of Rs.193990. /- has been transferred to your college Account as mentioned at the Point No. 3 of this Sanction Order by e-payment through PFMS portal vide date..... You are requested to acknowledge the receipt of the above amount in your account by sending back the enclosed stamped receipt within 7 days.

(R. Rayappa)  
 Accounts Office