



IEEE Computational Intelligence Chapter Bangalore Section (R-10), Bangalore High School Outreach Program

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Following are the activities conducted under IEEE CIS-high school outreach program in the month of November and December 2021. This program was designed to introduce concepts of computational intelligence (CI) to high school students of grade 8-10. Sessions were conducted for three different schools and totally 110 students attended the program. Session 1- 5 were conducted offline and later sessions 6 - 9 were conducted online due to Covid-19 pandemic situation and safety of children. Details of the activities are given below:

Local Organizer:

Organizer	High School
Ramaiah Institute of Technology (RIT) M.S Ramaiah Nagar, Mathikere, Bangalore, Karnataka, India-560054	M S Ramaiah High School MSR Nagar, MSRIT Post, Bangalore, Karnataka, India - 560054
	Vidyapeeth Public School, Chamundeswari Layout, Jalahalli East, Bengaluru, Karnataka, India -560097
	Bapu High School triveni Road, Yeshwantpur, Bengaluru, Karnataka 560022

Program Outcomes:

- 1) Students were able to explain the basic concepts of computational intelligence like neural networks, evolutionary computing etc.
- 2) Students were able to apply the computational intelligence concepts to solve problems given in the tutorials
- 3) Students explained different applications related to computational intelligence

4) Career guidance sessions helped students to understand different job opportunities and industry needs

5) Students and faculty of the school showed a lot of involvement in the program and initiated an idea of extending the same program to schools associated with NGOs. This will help in the future many high school students from orphanages and rural areas.

Program Schedule:

The program consisted of 9 sessions covering computational intelligence, its applications, Neural Network, Fuzzy logic, Evolutionary Computing, Data Analytics, Computer vision, Tutorials and career guidance. Each topic required 2 hrs of lecture. Total number of high school students were around 110. Classes were arranged in 3 batches considering free slots of students and faculty on the following dates.

S. No	Topic	Resource Person	Date
1	Computational intelligence- Fundamental concepts and significance	Dr. Vijaya Kumar B.P IEEE CIS Chair Professor, RIT, Bangalore	6/11/21
		Dr. Megha. P. Arakeri IEEE CIS-RIT student Chapter advisor, Associate Professor, RIT, Bangalore	
		Dr. Sumana.M Associate Professor RIT, Bangalore	
2	Real-world applications of computational intelligence	Dr. Vijaya Kumar B.P IEEE CIS Chair Professor, RIT, Bangalore	13/11/21
		Dr. Megha. P. Arakeri IEEE CIS-RIT student Chapter advisor, Associate Professor, RIT, Bangalore	
		Dr. Sumana.M Associate Professor RIT, Bangalore	
3	Artificial Neural Networks- Basics, Tools and Techniques	Dr. Vijaya Kumar B.P IEEE CIS Chair Professor, RIT, Bangalore	20/11/21
		Dr. Megha. P. Arakeri IEEE CIS-RIT student Chapter advisor, Associate Professor, RIT, Bangalore	
		Dr. Sumana.M Associate Professor RIT, Bangalore	
4		Dr. Vijaya Kumar B.P IEEE CIS Chair	

	Tutorials on Neural Networks	Professor, RIT, Bangalore Dr. Megha. P. Arakeri IEEE CIS-RIT student Chapter advisor, Associate Professor, RIT, Bangalore Dr. Sumana.M Associate Professor RIT, Bangalore	27/11/21
5	Fuzzy Logic-Basics, Tools and Techniques	Dr. Vijaya Kumar B.P IEEE CIS Chair Professor, RIT, Bangalore Nishant Krishna, Chief Technology Officer, TechMachinery Labs, Bangalore Dr. Sumana.M Associate Professor RIT, Bangalore	4/12/21
6	Evolutionary Computing-Basics, Tools and Techniques	Dr. Vijaya Kumar B.P IEEE CIS Chair Professor, RIT, Bangalore Dr. Megha. P. Arakeri IEEE CIS-RIT student Chapter advisor, Associate Professor, RIT, Bangalore Dr. Sumana.M Associate Professor RIT, Bangalore	17/12/21
7	Computational Intelligence for Data Analytics	Dr. Vijaya Kumar B.P IEEE CIS Chair Professor, RIT, Bangalore Dr. Megha. P. Arakeri IEEE CIS-RIT student Chapter advisor, Associate Professor, RIT, Bangalore Dr. Sumana.M Associate Professor RIT, Bangalore	18/12/21
8	Computational Intelligence for Computer Vision and Robotics	Dr. Vijaya Kumar B.P IEEE CIS Chair Professor, RIT, Bangalore Dr. Megha. P. Arakeri IEEE CIS-RIT student Chapter advisor, Associate Professor, RIT, Bangalore Dr. Sumana.M Associate Professor RIT, Bangalore	24/12/21
9	Career opportunities in computational intelligence	Nishant Krishna, Chief Technology Officer, TechMachinery Labs, Bangalore Vinayak Pai, Practice Lead-Data Engineering, Mindtree, Bangalore	31/12/21

		A T Kishore Vidyasanga Technologies, Bangalore	
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Details of different sessions are given below along with few snapshots:

- 1. Computational Intelligence-Fundamental concepts and significance:** This session covered basic concepts of computational intelligence and its need in today's world. The difference between computational intelligence and artificial intelligence was also presented. Various computing paradigms of computational intelligence such as evolutionary computing, fuzzy systems and neural networks were discussed in brief. Tutorial problems on computational intelligence concepts were given to students and tools demonstrated to showcase its usefulness.



- 2. Real-world applications of computational intelligence:** This session covered different applications of computational intelligence like smart cities, agriculture, Health care, security, entertainment, education etc. Students understood the benefits of computational intelligence and how it can help automate various processes. Tools related to computational intelligence was demonstrated and tutorial exercise questions were given to students.



- 3. Artificial Neural Networks-Basics, Tools and Techniques:** This session focused on data, its storage, volume and techniques for analysis. The challenges encountered in machine

learning, applications and recent trends were also discussed. Students were also asked to explain the real life examples of machine learning. Neural network tools were demonstrated to students.



4. Tutorials on Neural Networks: Students were given tutorial problems on neural networks to make them understand how its working principle. This will also help students in improving technical, problem solving and analytical skills.



5. Fuzzy Logic-Basics and Techniques: Students were introduced to the concept of fuzzy sets and how these are helpful in in handling data in various applications. Students were

introduced to real life examples to make the concept more clear. Tool related to fuzzy logic was also demonstrated and tutorial problems were given to solve.

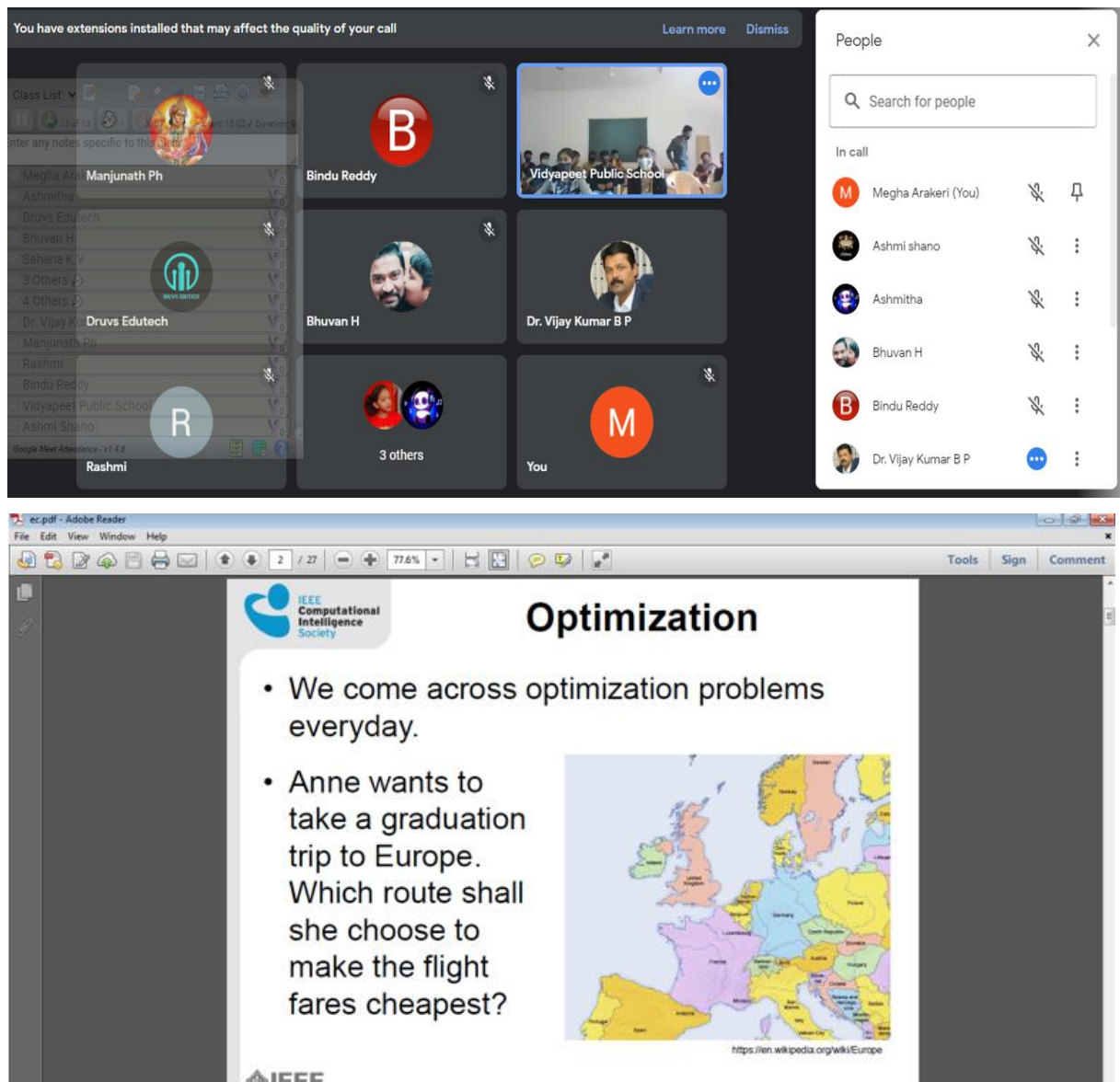


As per the suggestions of IEEE CIS, session-6 to session-9 were conducted online due to Covid-19 situation in the country.

6. Evolutionary Computing-Basics, Tools and Techniques

This session introduced students to the basic concepts of evolutionary computing, techniques and applications. In addition to this how it can help solve optimization problems was taught to students. An evolutionary algorithm mechanism based on reproduction, mutation, recombination and selection was discussed by taking example of genetic algorithm. Tools

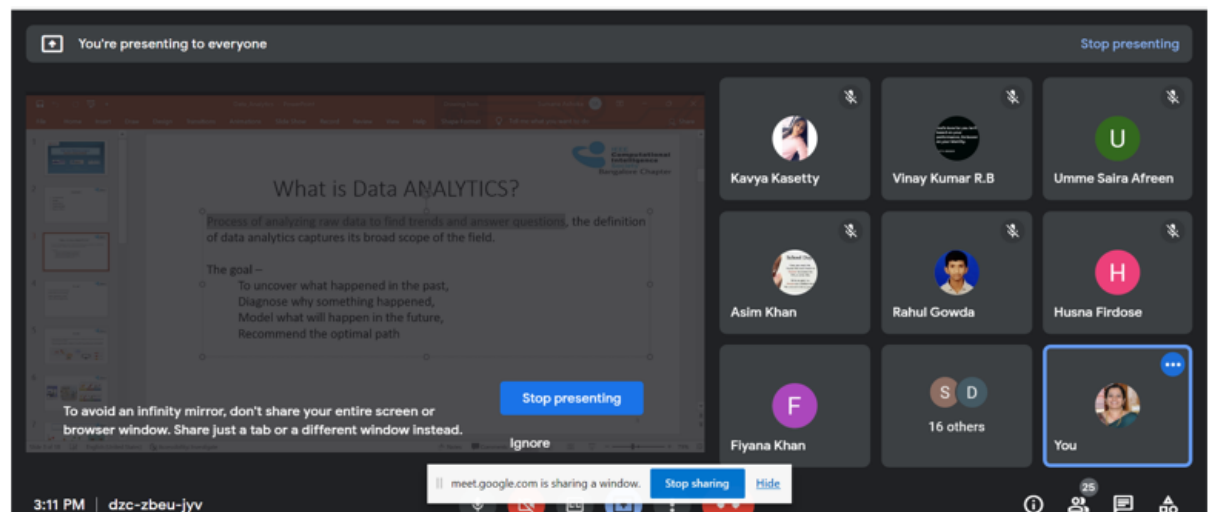
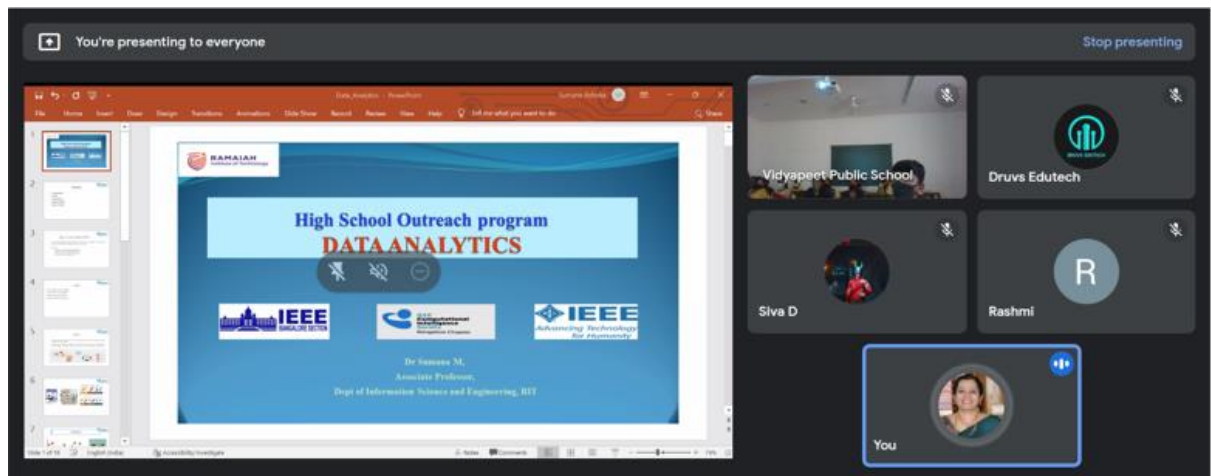
related to evolutionary computing were also demonstrated. Tutorial problems on optimization problems like knapsack, travelling salesman, and cost function were shared. A quiz was conducted at the end of the session to make the students assess their level of understanding and motivational prizes were also given to students.



7. Computational Intelligence for Data Analytics

Data analytics is the science of analysing raw data to make conclusions about that information. The necessity of developing fast algorithms capable of dealing with a range of complex problems where intelligent decision-making or future predictions are based on the understanding of data collections was discussed. Different case studies were discussed such as smart city, intelligent transportation, and information retrieval. Tools related to data

analytics were also demonstrated. Students were also given tutorial problems to solve. This helped them to gain more understanding of the concepts.



8. Computational Intelligence for Computer Vision and Robotics

This session focused on digital image, image types and need for image processing. Then the concept was related to computer vision and its usefulness. Different computer vision applications were also discussed with respect to automation and robotics. Students were very excited to know how the robot is built, its functionalities and types. The session was very interactive where in students gave many examples of robot. The MATLAB tool was demonstrated to students on how to build image processing applications. Students were also given tutorial problems on applying operations on image matrix.

RAMAIAH

• Humanoid robots in Education

Subject Name	Total Questions	Correct Answers	Percentage	Indicator
AI Basics	5	4	80%	<div style="width: 80%;"></div>
Python	5	5	100%	<div style="width: 100%;"></div>
Introduction to ML	10	3	30%	<div style="width: 30%;"></div>
Neural Networks	5	1	20%	<div style="width: 20%;"></div>
Data Preprocessing	5	1	20%	<div style="width: 20%;"></div>
Modeling and Evaluation	4	1	25.00%	<div style="width: 25%;"></div>
Deployment	5	3	60%	<div style="width: 60%;"></div>
Future Trends	4	2	50.00%	<div style="width: 50%;"></div>
Overall Score	50	30	60%	<div style="width: 60%;"></div>

Participants: Syeda Suha, Neeraj S, Jehanika B.S, Aara Fathima, Dr. Megha Arakeri, Gudavalletti Har..., Greeshman Gowd..., Niveditha Sathal, Mokshika M, Divya shree Deepi..., Helen Hosanna, Sevitha Singh, Yashaswini N, Sanjana P, You

Dr. Megha Arakeri is presenting

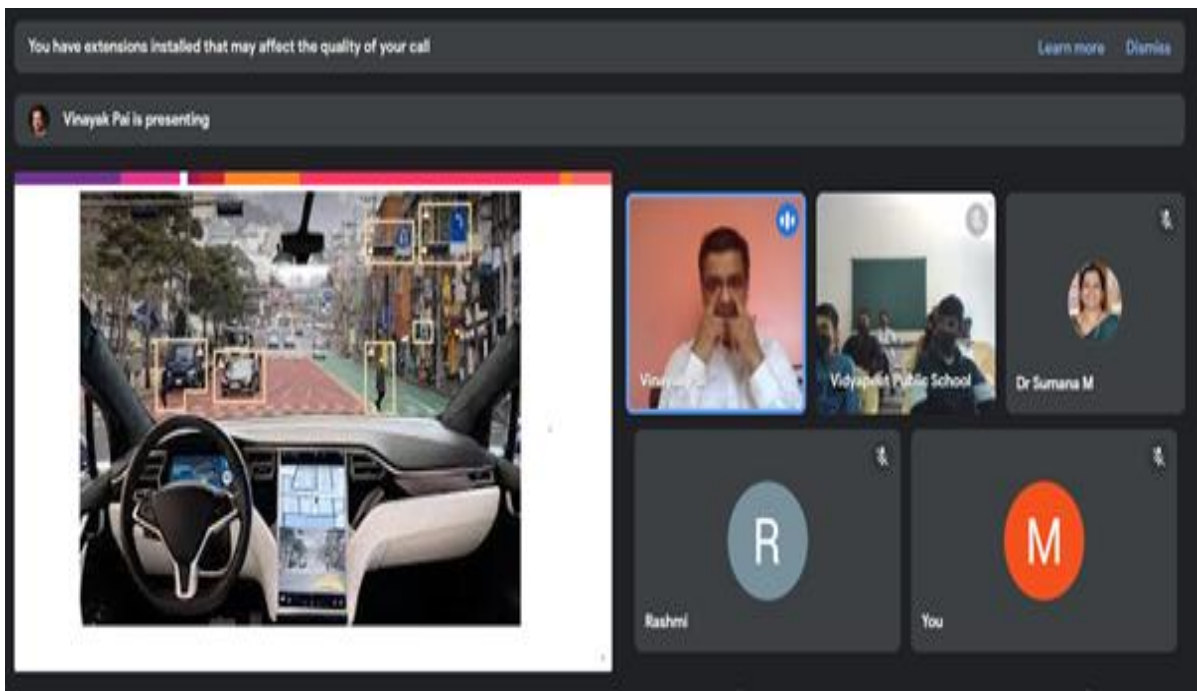
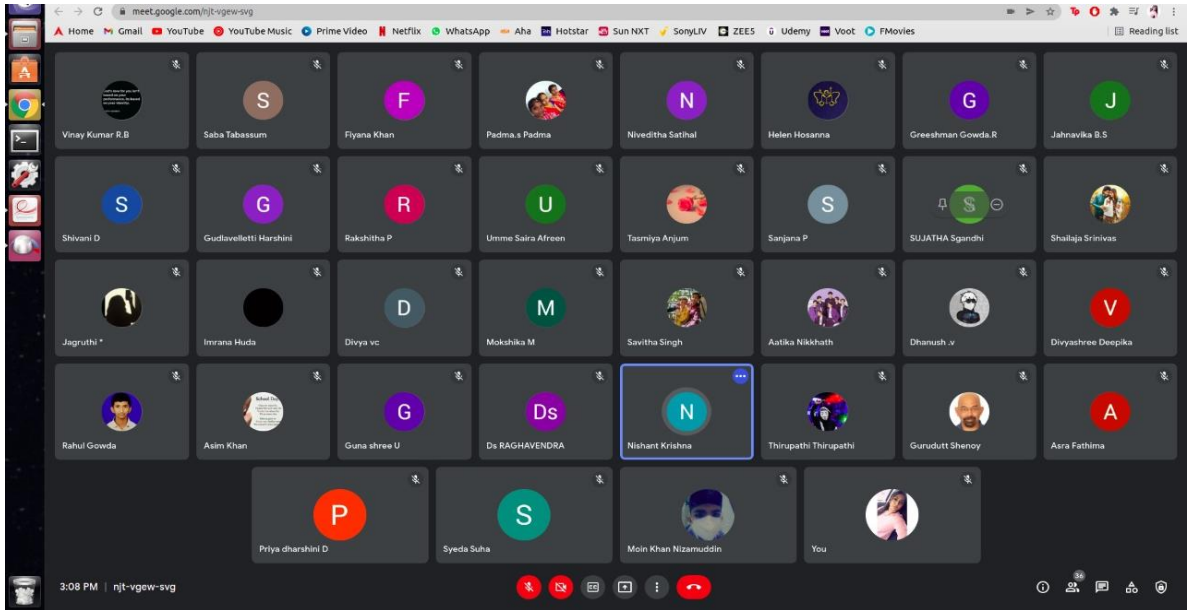
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9. Career Opportunities in Computational Intelligence

It was a highly interactive session with students asking the speaker the role, need, recent trends in the industry related to Artificial Intelligence, Data Science and Data Analytics. They wanted to know the reason behind the buzzword “Machine Learning”. Speakers were excited in providing a reflection to the students regarding the career opportunities in Computational Intelligence. They mentioned AI as an ability to taste, see, listen, speak, smell, write, understand, interpret, think and act. Students asked many questions regarding different job streams and the corresponding education requirement in computational intelligence.



Fund Utilization Details:

The fund sanctioned was utilized for providing course material preparation cost, reading and writing material, tutorial preparation, prizes for students, teaching and documentation accessories. Details are as follows:

Total Amount Sanctioned: \$1500 (Rs. 1,13,925)

Total Amount Utilized: \$1500 (Rs. 1,13,925)

1) Course session teaching material preparation and delivery

S. No	Topic	Resource Person	Date	Amount (Rs)
1	Computational intelligence- Fundamental concepts and significance	Dr. Vijaya Kumar B.P IEEE CIS Chair Professor, RIT, Bangalore	6/11/21	2000
		Dr. Megha. P. Arakeri IEEE CIS-RIT student Chapter advisor, Associate Professor, RIT, Bangalore		2000
		Dr. Sumana.M Associate Professor RIT, Bangalore		2000
2	Real-world applications of computational intelligence	Dr. Vijaya Kumar B.P IEEE CIS Chair Professor, RIT, Bangalore	13/11/21	2000
		Dr. Megha. P. Arakeri IEEE CIS-RIT student Chapter advisor, Associate Professor, RIT, Bangalore		2000
		Dr. Sumana.M Associate Professor RIT, Bangalore		2000
3	Artificial Neural Networks-Basics, Tools and Techniques	Dr. Vijaya Kumar B.P IEEE CIS Chair Professor, RIT, Bangalore	20/11/21	2000
		Dr. Megha. P. Arakeri IEEE CIS-RIT student Chapter advisor, Associate Professor, RIT, Bangalore		2000
		Dr. Sumana.M Associate Professor RIT, Bangalore		2000
4	Tutorials on Neural Networks	Dr. Vijaya Kumar B.P IEEE CIS Chair Professor, RIT, Bangalore	27/11/21	2000
		Dr. Megha. P. Arakeri IEEE CIS-RIT student Chapter advisor, Associate Professor, RIT, Bangalore		2000
		Dr. Sumana.M		2000

		Associate Professor RIT, Bangalore		
5	Fuzzy Logic-Basics, Tools and Techniques	Dr. Vijaya Kumar B.P IEEE CIS Chair Professor, RIT, Bangalore	4/12/21	2000
		Nishant Krishna, Chief Technology Officer, TechMachinery Labs, Bangalore		2000
		Dr. Sumana.M Associate Professor RIT, Bangalore		2000
6	Evolutionary Computing-Basics, Tools and Techniques	Dr. Vijaya Kumar B.P IEEE CIS Chair Professor, RIT, Bangalore	17/12/21	2000
		Dr. Megha. P. Arakeri IEEE CIS-RIT student Chapter advisor, Associate Professor, RIT, Bangalore		2000
		Dr. Sumana.M Associate Professor RIT, Bangalore		2000
7	Computational Intelligence for Data Analytics	Dr. Vijaya Kumar B.P IEEE CIS Chair Professor, RIT, Bangalore	18/12/21	2000
		Dr. Megha. P. Arakeri IEEE CIS-RIT student Chapter advisor, Associate Professor, RIT, Bangalore		2000
		Dr. Sumana.M Associate Professor RIT, Bangalore		2000
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		Dr. Megha. P. Arakeri IEEE CIS-RIT student Chapter advisor, Associate Professor, RIT, Bangalore		2000
		Dr. Sumana.M Associate Professor RIT, Bangalore		2000
9	Career opportunities in computational intelligence	Nishant Krishna, Chief Technology Officer, TechMachinery Labs, Bangalore	31/12/21	2000
		Vinayak Pai, Practice Lead- Data Engineering, Mindtree		2000
		A T Kishore Vidyasangha Technologies, Bangalore		2000
Total				Rs. 54,000 (\$712.74)

2) Tutorial material and handout preparation, tool demonstration

S. No	Topic	Resource Person	Amount (Rs)
1	Computational intelligence- Fundamental concepts and significance	Dr. Vijaya Kumar B.P IEEE CIS Chair Professor, RIT, Bangalore	1000
2	Real-world applications of computational intelligence	Dr. Vijaya Kumar B.P IEEE CIS Chair Professor, RIT, Bangalore	1000
3	Artificial Neural Networks-Basics, Tools and Techniques	Dr. Megha. P. Arakeri IEEE CIS-RIT student Chapter advisor, Associate Professor, RIT, Bangalore	1000
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8	Computational Intelligence for Computer Vision and Robotics	Dr. Megha. P. Arakeri IEEE CIS-RIT student Chapter advisor, Associate Professor, RIT, Bangalore	1000
9	Career opportunities in computational intelligence	Vinayak Pai, Practice Lead- Data Engineering, Mindtree, Bangalore	1000
Total			Rs. 9000
10	Meeting expenses, travel, coordination and refreshments for students and resource persons		Rs. 3000
Total			Rs. 12,000 (\$158.39)

3) Reading and writing materials

S.No	Item	Cost (Rs)
1	Note books, pencils, pens, reading material-books	Rs. 30,000
Total		Rs. 30,000 (\$395.97)

4) Nominal prizes and goodies for competitions and motivational activities (100 students)

S. NO	School	No. of prizes/goodies	Amount
1	M S Ramaiah High School MSR Nagar, MSRIT Post, Bangalore, Karnataka, India - 560054	40	Rs. 4000
2	Vidyapeeth Public School, Chamundeswari Layout, Jalahalli East, Bengaluru, Karnataka, India -560097	35	Rs.3500
3	Bapu High School triveni Road, Yeshwantpur, Bengaluru, Karnataka 560022	25	Rs. 2500
Total			Rs. 10,000 (\$131.99)

5) Teaching accessories and online charges

S.No	Item	Cost (Rs)
1	earphones, batteries, mouse for online teaching and printer for documentation and handouts preparation	Rs. 7925
Total		Rs. 7925 (\$104.60)

Following are the few snapshots of the resource persons and school interactions

