

"Dissemination of Education through Knowledge, Science and Culture".

--Shikshanmaharshi Dr. Babuji Salunkhe

**Shri Swami Vivekanand Shikshan Sanstha, Kolhapur's**  
**Padmabhushan Dr.Vasantraodada Patil**

**Mahavidyalaya, Tasgaon**

Tal. Tasgaon. Dist. Sangli-416 312 (Maharashtra)

(Affiliated to Shivaji University, Kolhapur)

**DEPARTMENT OF**  
**COMPUTER-SCIENCE**

(2020-21)

A CERTIFICATE COURSE IN

**Advanced Data Science**



"Dissemination of Education through Knowledge, Science and Culture".

--Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Vivekanand Shikshan Sanstha, Kolhapur's

Padmabhushan Dr.Vasandraodada Patil

Mahavidyalaya, Tasgaon

Tal. Tasgaon. Dist. Sangli-416 312 (Maharashtra)

(Affiliated to Shivaji University, Kolhapur)

**Title of the Certificate Course**

**"Advanced Data Science"**

Organizer: Department Of Computer Science & Application  
and  
Internal Quality Assurance cell (IQAC) PDVP College,  
Tasgaon

Total No Of Student Participated: 110

Total no of faculty conducted : 02

Kumbhar V.T.  
Course Co-ordinator,  
Career Oriented Course,  
9 August, 2020

To,  
The Principal,  
P D V P College,  
Tasgaon- 416 312.

Sub: - Regarding Permission to commencement of (COC) Certificate course.....

Respected Sir,

With reference to above subject, our college is going to start a certificate course entitled “ **Advanced Data Science**“ for B.SC. PART-I,II&III (Computer students) in this current academic year. So, I request you to kindly give me permission to commencement above said course.  
Please consider the same and oblige.

Thanking you

  
**Prtn. Dr. Milind S. Hujare**  
**Principal**  
Padmabhushan Dr. Vasantodada Patil  
Mahavidyalaya, Tasgaon (Sangli).

  
**HOD**  
**Head,**  
Department of Computer Science  
Padmabhushan Dr. Vasantodada Patil  
Mahavidyalaya, TASGAON- Dist. Sangli

\*\*\*\*Dissemination of Educational Knowledge, Science and Culture\*\*\*\* Shikshanmaharashtri Dr. Bapuji Salunkhe  
Shri Swami Vivekanand Shikshan Sanstha, Kolhapur's

**Padmabhushan Dr. Vasantraodada Patil Mahavidyalaya, Tasgaon**  
Department Of Computer Science & Application  
**A Certificate Course in INTRODUCTION TO ARTIFICIAL INTELLIGENCE**  
Academic year 2020-21

DATE: 10-05-2020

The meeting of BOS for preparation of syllabus of a certificate course in INTRODUCTION TO ARTIFICIAL INTELLIGENCE was held in Monday 10-05-2020. The following members of the committee were present for the preparation of syllabus.

Sr.No.	Name	Designation	College Name	Sign
1	Mr. Kumbhar V.T.	Chairman	P.D.V.P. College, Tasgaon	
2	Mrs. Kumbhar N.V.	Member	P.D.V.P. College, Tasgaon	
3	Mr. Shantinath Patil	Member	K.W.C. College, Sangli	
4	Mr. Toshif Mulla	Member	Adarsh College, Vita	
5	Mr. Sandeep Patil	Member	A.C.S. College, Palus	
6	Mr. Wagh A.A.	Member	P.D.V.P. College, Tasgaon	

The syllabus for said course has been prepared and the copy of the Syllabus for said course has been prepared and the copy of the same is enclosed here with for your kind information and further action.

Thanking You,

**Prtn. Dr. Milind S. Hujare**  
**Principal**  
Padmabhushan Dr. Vasantraodada Patil  
Mahavidyalaya, Tasgaon (Sangli).

**HOD**  
**Head,**  
Department of Computer Science  
Padmabhushan Dr. Vasantraodada Patil  
Mahavidyalaya, Tasgaon (Sangli)



''ज्ञान, विज्ञान आणि सुसंस्कार यांसाठी शिक्षणप्रसार'' - शिक्षणमहर्षी डॉ. बापूजी साळुंखे

Shri Swami Vivekanand Shikshan Sanstha, Kolhapur's

**PADMABHUSHAN DR. VASANTODADA PATIL MAHAVIDYALAYA**

TASGAON, Dist. Sangli, Pin- 416 312 ☎ - STD : 02346-250665, 250575 FAX : 250575

● Affiliated to Shivaji University, Kolhapur ●

E-mail : san.pdvpm.tas@gmail.com Website : www.pdvpmtasgaon.edu.in

Established Year : June 1962 P. B. No. : 14 Jr. College No. : J22-10-001 Sr. College Code No. :  $\frac{SIACH}{X}$  Jr.: C-8



NAAC Reaccredited 'B' (2.76)

ISO Certified : 9001:2015

Shikshanmaharshi  
Dr. Bapuji Salunkhe  
B.A., B.T., D.Lit.  
FOUNDER

Hon. Chandrakant (Dada) Patil  
PRESIDENT  
B.Com.  
Ex- Minister of Revenue, Public Works  
Govt. of Maharashtra

Prin. Abhaykumar Salunkhe  
M.A.  
CHAIRMAN

Prin. Mrs. Shubhangi Gawade  
M.Sc. B.Ed.  
SECRETARY

Dr. Milind S. Hujare  
M.Sc., Ph.D.  
PRINCIPAL

10-08-2021

Ref.No. : PDVPMT /

Date :

To,  
Mr. V.T Kumbhar,  
Assistant Professor,  
Department of Computer Science,  
P. D. V. P. College, Tasgaon

**Subject: - Regarding Meeting of BOS for Syllabus Preparation.....**

Respected Sir/Madam,

With reference to the above mentioned subject, you are appointed as Member of Board of Studies (BOS) of Certificate Course entitled "**Advanced Data Science**" to be conducted by The Department of Computer Science in our college during the academic year 2020-21.

The meeting of BOS is conveyed on **10<sup>th</sup> August 2020** for the preparation of syllabus of Certificate course entitled "**Data Science**". So, you are kindly requested to attend the meeting at 11:00 a.m. in IQAC Office of the college.

Thanking you,

*Alka*

**IQAC Director**

*Milind S. Hujare*  
Prin. Dr. Milind S. Hujare  
Principal  
Padmabhushan Dr. Vasantodada Patil  
Mahavidyalaya, Tasgaon (Sangli).



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NAAC Reaccredited 'B' (276)

ISO Certified : 9001:2015

Shikshanmaharshi  
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B.A., B.T., D.Lit.  
FOUNDER

Hon. Chandrakant (Dada) Patil  
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M.Sc., B.Ed.  
SECRETARY

Dr. Milind S. Hujare  
M.Sc., Ph.D.  
PRINCIPAL

10/08/2021

Ref.No. : PDVPMT /

Date :

To,  
Mr. Shantinath Patil,  
Assistant Professor,  
Department of Computer Science,  
K.W.C.College,sangli

**Subject: - Regarding Meeting of BOS for Syllabus Preparation.....**

Respected Sir/Madam,

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Thanking you,

*Alka*

**IQAC Director**

*Milind S. Hujare*  
Prin. Dr. Milind S. Hujare  
Principal  
Padmabhushan Dr. Vasanttraodada Patil  
Mahavidyalaya, Tasgaon (Sangli).



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SECRETARY

Dr. Milind S. Hujare  
M.Sc., Ph.D.  
PRINCIPAL

Ref.No. : PDVPMT /

Date 10/08/2020

To,  
Mr. Toshif Mulla  
Assistant Professor,  
Department of Computer Science,  
Adarsh College, Vita

**Subject: - Regarding Meeting of BOS for Syllabus Preparation.....**

Respected Sir/Madam,

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Thanking you,

Ailka

**IQAC Director**

Prin. Dr. Milind S. Hujare  
Principal  
Padmabhushan Dr. Vasanttraodada Patil  
Mahavidyalaya, Tasgaon (Sangli).



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SECRETARY

Dr. Milind S. Hujare  
M.Sc., Ph.D.  
PRINCIPAL

Ref.No. : PDVPMT /

Date : 10/08/2020

To,  
Mr.SandeepPatil.  
Assistant Professor,  
Department of Computer Science,  
A.C.S.College,Palus

**Subject: - Regarding Meeting of BOS for Syllabus Preparation.....**

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Thanking you,



IQAC Director

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Dr. Milind S. Hujare  
M.Sc., Ph.D.  
PRINCIPAL

Ref.No. : PDVPMT /

Date :



**Assistant Professor,  
Department of Computer Science,  
P. D. V. P. College, Tasgaon**

**Subject: - Regarding Meeting of BOS for Syllabus Preparation.....**

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Thanking you,



**IQAC Director**



**Prin. Dr. Milind S. Hujare**  
**Principal**  
Padmabhushan Dr. Vasantodada Patil  
Mahavidyalaya, Tasgaon (Gangli).

"Dissemination of Education for Knowledge, Science and Culture" -Shikshanmaharashi  
Dr. Bapuji Salunkhe  
Shri Swami VivekanandShikshanSanstha, Kolhapur's  
**Padmabhushan Dr.vasatraodada Patil Mahavidyalaya, Tasgaon**  
**DEPARTMENT OF COMPUTER SCIENCE**  
**A Certificate Course in Advanced Data Science**  
**Time Table**  
**Academic year 2020-21**

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Time	Monday	Thursday	Wednesday	Thursday	Friday	Saturday
8 to 9 am	Theory	Theory	Theory	Theory	Theory	Theory
9 to 10 am	Practical	Practical	Practical	Practical	Practical	Practical

  
**HOD**  
**Head,**  
Department of Computer Science  
Padmabhushan Dr. Vasatraodada Patil  
Mahavidyalaya, TASGAON, Dist. Sangli

  
**Prin. Dr. Milind S. Hujare**  
**Principal**  
Padmabhushan Dr. Vasatraodada Patil  
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**PadmabhushanDr.vasatraodadaPatilMahavidyalaya, Tasgaon**  
Department of Computer Science  
A Certificate Course in Advanced Data Science  
**Academic year 2020-21**

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## NOTICE

18 July2020

All the students of B.SC. PART-I,II &III (Computer students) are hereby informed that, the examination Of Advanced Data Science certificate course will be held as per following shedule

SR.NO	PAPER	DAY	DATE	TIME
1	Theory	MONDAY	25/08/2020	8 to 11 am
2	Practical	THURSDAY	10/09/2020	8 to 11 am

  
MOD  
Head,

Department of Computer Science  
Padmabhushan Dr. Vasatraodada Patil  
Mahavidyalaya, Tasgaon (Dist. Sangli)

  
Prin. Dr. Milind S. Hujare  
Principal

Padmabhushan Dr. Vasatraodada Patil  
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**PadmabhushanDr.vasatraodadaPatilMahavidyalaya, Tasgaon**  
**Department of Computer Science**  
**A Certificate Course in Advanced Data Science**  
**Academic year 2020-21**

---

## NOTICE

**8 AUGUST 2020**

All the students of B.SC. PART-I,II &III (Computer students) are hereby informed that, our college is going to start a certificate course entitled “**Advanced Data Science**” for this current academic year .All the students should take admissions as earlier

  
HOD  
Head,  
Department of Computer Science  
Padmabhushan Dr. Vasatraodada Patil  
Mahavidyalaya, TASGAON- Dist. Sangli

  
Prin. Dr. Milind S. Hujare  
Principal  
Padmabhushan Dr. Vasatraodada Patil  
Mahavidyalaya, Tasgaon (Sangli).

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**PadmabhushanDr.vasatraodadaPatilMahavidyalaya, Tasgaon**

**Department of Computer Science**

**Paper No.1**

**Advanced Data Science  
(Theory)**

**Marks:50**

## **Course Syllabus**

### **Course outcomes:**

1. Introduce major deep learning algorithms, the problem settings, and their applications to solve real world problems.
2. Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.
3. Implement deep learning algorithms and solve real-world problems.

### Unit-I

**Numerical Computation:** Overflow and Underflow, Poor Conditioning, Gradient-Based Optimization, Constrained Optimization, Stochastic Gradient Descent Deep Networks: Challenges Motivating Deep Learning, Deep Feedforward Networks, Example: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

### Unit-II

**Regularization for Deep Learning:** Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness , Semi-Supervised Learning , Multi-Task Learning , Early Stopping, Parameter Tying and Parameter Sharing , Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training , Tangent Distance, Tangent Prop, and Manifold Tangent Classifier

### Unit-III

**Optimization for Training Deep Models:** How Learning Differs from Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms

### Unit-IV

**Convolutional Networks:** The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs , Data Types, Efficient Convolution Algorithms , Random or Unsupervised Features, The Neuroscientific Basis for Convolutional Networks.

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**Department of Computer Science**  
**A Certificate Course in Advanced Data Science**  
**Academic year 2020-21**  
**Evaluation System**

**Nature of Theory Question Paper: (Maximum Marks 50)**

- 1. Choose correct alternatives. 10 Marks(Each 1 mark)**
- 2. Attempt any two (out of three sub questions). 20 Marks(Each 10 marks)**
- 3. Attempt any four out of six sub questions. 20 Marks(Each 5 marks)**

**References:**

1. Ian Goodfellow, YoshuaBengio, Aaron Courville , “ Deep Learning” , [www.deeplearningbook.org](http://www.deeplearningbook.org)
2. Adam Gibson and Josh Patterson, “Deep Learning: A Practitioner's Approach”, O'Reilly Media, Inc.
3. SantanuPattanayak, “Pro Deep Learning with TensorFlow: A Mathematical Approach”, Apress.
4. Daniel Slater, GianmarioSpacagna, and Peter Roelants, “ Python Deep Learning”, Packt
5. John D. Kelleher , Brendan Tierney , “ Data Science” (MIT Press Essential Knowledge series),

"Dissemination of Education for Knowledge, Science and Culture"

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Shri Swami VivekanandShikshan Sanstha, Kolhapur's

**Padmabhushan Dr.vasandraodada Patil Mahavidyalaya, Tasgaon**

**Department of Computer Science**

**QUESTION PAPER**

**Data Science**

Marks:50

Q 1) Choose Correct Alternative and rewrite it(one mark for each) [8 marks]

1. Data science is the process of diverse set of data through ?

- A. organizing data
- B. processing data
- C. analysing data
- D. All of the above

2. The modern conception of data science as an independent discipline is sometimes attributed to?

- A. William S.
- B. John McCarthy
- C. Arthur Samuel
- D. Satoshi Nakamoto

3. Which of the following language is used in Data science?

- A. C
- B. C++
- C. R
- D. Ruby

4. What is the work of Data Architect?

- A. utilize large data sets to gather information that meets their company's needs
- B. work with businesses to determine the best usage of the information yielded from data
- C. build data solutions that are optimized for performance and design applications
- D. All of the above

5. Which of the following is not a part of data science process?

- A. Discovery
- B. Model Planning
- C. Communication Building
- D. Operationalize

6. Which of the following are the Data Sources in data science?

- A. Structured
- B. UnStructured
- C. Both A and B
- D. None Of the above

7. Which of the following is correct skills for a Data Scientist?

- A. Probability & Statistics
- B. Machine Learning / Deep Learning
- C. Data Wrangling
- D. All of the above

8. Which of the following is one of the key data science skills?

- A. Statistics
- B. Machine Learning
- C. Data Visualization
- D. All of the above

Q 2) Attempt any two out of three questions(Each 10 marks)

[20 marks]

- 1) Explain Stochastic Gradient Deep network?
- 2) Explain semi supervised learning in regularization for deep learning ?
- 3) Explain Neuroscientific basis for convolution network?

Q.3) Attempt any four out of six questions?

- 1) Explain challenges in neural network optimization?
- 2) where do we use the concept of multitasking?
- 3) what is gradient descent algorithm with example?
- 4) Explain deep feedforward network?
- 5) what is meta algorithm?









## Certificate Course Computer Sc. 2020-21

### B. Sc. I

5150	MISS	ATTAR SUNAYANA JAVED
5151	MISS	BEDAGE NEHA POPAT
5153	MISS	BHOSALE POOJA MANOHAR
5154	SHRI	CHAVAN PRATHMESH PANDURANG
5155	SHRI	DESHMUKH NIKHIL SUDHAKAR
5156	MISS	GAVANDI VAISHNAVI SANJAY
5157	MISS	HINGMIRE DNYANESHWARI JITENDRA
5158	MISS	JADHAV MONIKA SUKHADEV
5159	SHRI	JADHAV SUMIT SUBHASH
5160	SHRI	JADHAV VISHAL HANMANT
5161	MISS	JAMADADE SHIVANI PRAVIN
5162	MISS	JAMDADADE MADHURA MANIK
5163	SHRI	KADAM SOURABH SANDEEP
5164	MISS	KAMBLE SANIKA SATISH
5165	SHRI	LOKHANDE ASMIT BHARAT
5166	MISS	MALI ANKITA SANJAY
5167	SHRI	MALI SURAJ NANDKUMAR
5168	SHRI	MANE AKASH MARUTI
5169	SHRI	MANE HARSHVARDHAN SANDIP
5170	SHRI	MANE RUSHIKESH DATTAJI
5171	MISS	MANE SAKSHI RAJENDRA
5172	SHRI	MANKAR ADESH RAJKUMAR
5173	MISS	MORE ANJALI RAMESH
5174	SHRI	MORE SWAPNIL NARAYAN
5175	SHRI	NAYKAWADI SOHEL SHABBIR
5176	MISS	PAKHARE SWATI BALASAHEB
5177	MISS	PATIL MANSEE PANDURANG
5179	SHRI	PATIL PRADIP ANKUSH
5180	SHRI	PATIL RAHUL RAJARAM

### B. Sc. II

5841	SHRI	ARADHYE PRASAD RAVINDRA
5842	SHRI	AUTADE TEJAS SANJAY
5843	SHRI	BHOSALE RUTOJ DAGADOO
5844	SHRI	CHAVAN VISHWAJEET VINAYAK
5845	SHRI	GOLGIRE VINAYAK VIJAY
5846	MISS	GURAV SAMIKSHA ABHIJEET
5847	SHRI	JADHAV SANKET SANJAY
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5849	SHRI	JAGTAP KARTIK RAJENDRA

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### B. Sc. III

6283	SHRI	ATTAR ARBAJ SHAHANWAJ
6284	MISS	ATTAR SWALEHA MANSUR
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6305	SHRI	TAMBOLI AMIR HASAN
6306	MISS	THORBOLE SAKSHI ASHOK

# Answer Paper

A.1 MCA

1] Data Science is the Process of diverse set of data through ?

- A) Organizing data
  - B) processing data
  - C) analysing data
  - D) All of the above
- ⇒ D) All of the above

2] The modern conception of data science as an independent discipline is sometimes attributed to ?

- A) william S.
  - B) John McCarthy
  - C) Arthur Samuel
  - D) Satoshi Nakamoto
- ⇒ A) william S.

3] which of the following language is used in Data Science?

- A) C
  - B) C++
  - C) R
  - D) Ruby
- ⇒ C) R

4] what is the work of Data Architect ?

- A) utilize large data sets to gather information that meets their company's needs
- B) work with business to determine the best usage of the information yielded from data
- C) Build data solutions that are required optimized for performance & design applic
- D) All of the above



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⇒ c) Build data solutions that are optimized for performance & design applications.

5] which of the following is not a part of data science process?

- A) Discovery
  - B) Model planning
  - C) Communication Building
  - D) Operationalize
- ⇒ C) Communication Building

6] which of the following are the Data Sources in data science?

- A) Structured
- B) unstructured
- C) Both A & B
- D) None of the above.

⇒ ~~B) None of the above~~ C) Both A & B

7] which of the following is correct skills for a Data Scientist?

- A) Probability & Statistical
- B) Machine learning / Deep learning
- C) Data Wrangling
- D) All of the above

⇒ D) All of the above

8] which of the following is one of the key data science skills?

- A) Statistics
- B) Machine learning
- C) Data visualization
- D) All of the above

⇒ D) All of the above

Q.2  
a)

### Stochastic Gradient Deep network:-

The word 'Stochastic' means a system or a process that is linked with a random probability. Hence in Stochastic Gradient Descent, a few samples are selected randomly instead of the whole data set for each iteration. In Gradient descent, there is a term called 'batch' which denotes the total number of samples from a dataset that is used for calculating the gradient for each iteration. In typical Gradient descent optimization, like Batch Gradient descent the batch is taken to be the whole dataset. Although, using the whole dataset is really useful for getting to the minima in a less noisy & less random manner, but the problem arises when our datasets gets big.

Suppose, you have a million samples in your dataset, so if you use a typical gradient descent optimization technique, you will have to use all of the one million samples for completing one iteration while performing the gradient descent, & it has to be done for every iteration until the minima is reached. Hence, it becomes computationally very expensive to perform.

This problem is solved by Stochastic Gradient Descent. In SGD, it uses only a single sample, i.e., a batch size of one to perform each iteration. The sample is

Randomly Shuffled & Selected for performing the iteration  
SGD algorithm :-

for  $i$  in range ( $m$ ):

$$\theta_j = \theta_j - a(\hat{y}^i - y^i) x_j^i$$

So, in SGD, we find out the gradient of the cost function of a single example at each iteration instead of the sum of the gradient of the cost function of all the examples.

2] Semi-Supervised learning in Regularization for deep learning :-

Semi-Supervised learning is an approach to machine learning that combines a small amount of labeled data with a large amount of unlabeled data during training. Semi-Supervised learning falls between unsupervised learning (with no labeled training data). It is a special instance of weak supervision.



An example of the influence of unlabeled data in semi-supervised learning. The top

panel shows a decision boundary we might adopt after seeing only one positive (with circle) & one negative (black circle) example. The bottom panel shows a decision boundary we might adopt if, in addition to the two labeled examples, we were given a collection of unlabeled data (gray circles). The cloud could be viewed as performing clustering & then labeling the clusters & then labeling with the labeled data, pushing the decision boundary away from high-density regions, or learning an underlying one-dimensional manifold where the data reside.

Unlabeled data, when used in conjunction with a small amount of labeled data, can produce considerable improvement in learning accuracy. The acquisition of labeled data for a learning problem often requires a skilled human agent or a physical experiment.

The cost associated with the labeling process, that may render large, fully labeled training sets infeasible, whereas acquisition of unlabeled data is relatively inexpensive. In such situations, semi-supervised learning can be of great practical value. Semi-supervised learning is also of theoretical interest in machine learning & as a model for human learning.

Q.3

a)

Challenges of Neural Network Optimization:

1) III - Conditioning of the Hessian -

Even when optimizing convex functions one problem is an ill conditioned Hessian.

matrix,  $H$ :

- Very general problem in optimization, convex or not.

\* Result of III - Conditioning: - causes SGD to be stuck. even very small steps cause increases in cost function

if Local Minima

- In convex optimization, problem is one of finding a local minimum.
- Some convex functions have a flat region rather than a global minimum point.

3] Model Identifiability:

- Model is identifiable if large training sample set can be rule out all but one setting of parameters?
- Even if a neural net has uncountable no. of minima, they are equivalent of cost.

c) Gradient Descent:

Gradient descent is an optimization algorithm for finding a local minimum of a differentiable function. You start by defining the initial parameters values & from there gradient descent uses calculus to iteratively adjust the values so they minimize the given cost function.

Steps of gradient descent:

Following the mountain example, we will call agent as the blinded person. In each position, the agent only knows two things: the gradient (for that position, or parameters) & the width of the step to take (learning rate). With that information,

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the current value of each parameter is updated with the new parameter values, the gradient is re-calculated & the process is repeated until reach convergence or local minima

Let's revise how the gradient descent algorithm works at each step.

Repeat until hit convergence

- 1) Given the gradient, Calculate the change in the parameters with the learning rate
- 2) Re-calculate the new gradient with the new value of the parameter
- 3) Repeat Step 1

Here is the formula of gradient descent algorithm

Repeat until convergence  $\theta_j \leftarrow \theta_j - \alpha \frac{\partial J}{\partial \theta_j}$

3

Fig- Gradient Descent algorithm.

e) Hidden Units:-

In Neural Networks, a hidden layer is located between the input & output of the algorithm, in which the function applies weights to the inputs & directs them through an activation function as the output. In short, the hidden layers perform nonlinear transformations of the inputs entered into the network. Hidden layers vary depending on the function of the layers may vary depending on their associated weights. Each of the hidden units is a Squashed linear function of its inputs. Neural network of this type can have as inputs any real

numbers as output. For regression, it is typical for the output units to be a linear function of their inputs.

#### f) Meta Algorithm :-

The term "meta-algorithm" has a fairly well-accepted meaning in the context of learning theory, which is the field of research from which multiplicative weights originates.

Specifically, a meta-algorithm, in the context learning theory, is an algorithm that decides how to make a set of other (typically, though not necessarily non-meta) "algorithms" (which might be as dumb as a constant output, for example) & constructs a new algorithm out of those, often by combining or weighting the outputs of the component algorithms. Typically those component algorithms are viewed as black-boxes taking input & producing their output, with the inner workings hidden / irrelevant.

Just a few examples of meta-algorithms that I can think of at the moment

- Multiplicative layer
- Weighted majority
- Boosting
- Bagging
- ensemble averaging, Voting
- Follow the leader

## Certificate Course Computer Sc. 2020-21

### B. Sc. I

Roll_No	Name Of The Students	Marks(50)
5150	ATTAR SUNAYANA JAVED	40
5151	BEDAGE NEHA POPAT	44
5153	BHOSALE POOJA MANOHAR	40
5154	CHAVAN PRATHMESH PANDURANG	42
5155	DESHMUKH NIKHIL SUDHAKAR	40
5156	GAVANDI VAISHNAVI SANJAY	42
5157	HINGMIRE DNYANESHWARI JITENDRA	44
5158	JADHAV MONIKA SUKHADEV	42
5159	JADHAV SUMIT SUBHASH	40
5160	JADHAV VISHAL HANMANT	30
5161	JAMADADE SHIVANI PRAVIN	40
5162	JAMDADE MADHURA MANIK	40
5163	KADAM SOURABH SANDEEP	38
5164	KAMBLE SANIKA SATISH	36
5165	LOKHANDE ASMIT BHARAT	42
5166	MALI ANKITA SANJAY	40
5167	MALI SURAJ NANDKUMAR	40
5168	MANE AKASH MARUTI	38
5169	MANE HARSHVARDHAN SANDIP	42
5170	MANE RUSHIKESH DATTAJI	40
5171	MANE SAKSHI RAJENDRA	40
5172	MANKAR ADESH RAJKUMAR	42
5173	MORE ANJALI RAMESH	40
5174	MORE SWAPNIL NARAYAN	40
5175	NAYKAWADI SOHEL SHABBIR	36
5176	PAKHARE SWATI BALASAHEB	42
5177	PATIL MANSEE PANDURANG	40
5179	PATIL PRADIP ANKUSH	42
5180	PATIL RAHUL RAJARAM	40

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5841	ARADHYE PRASAD RAVINDRA	40
5842	AUTADE TEJAS SANJAY	42
5843	BHOSALE RUTOJ DAGADOO	44
5844	CHAVAN VISHWAJEET VINAYAK	46



5845	GOLGIRE VINAYAK VIJAY	40
5846	GURAV SAMIKSHA ABHIJEET	32
5847	JADHAV SANKET SANJAY	36
5848	JADHAV YOGESH UDDHAV	48
5849	JAGTAP KARTIK RAJENDRA	44
5850	KAMBLE SHREYA RAMESH	42
5851	KHARADE MRUNALI HARESH	42
5852	MALI ANIKET SAKHARAM	40
5853	MALI NILESH SURESH	44
5854	MALI SANKET ASHOK	40
5855	MALI SWAPNIL KRISHNA	40
5856	MALI TUSHAR SANJAY	44
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5858	MANE JITENDRA DHONDIRAM	40
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5867	PATIL NARAYAN BHASKAR	40
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5893	PARDESHI GAUTAM AVINASH	44
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5895	PATIL POOJA TANAJI	44
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5900	SAWANT RUTUJA SANDESH	42
5901	SHINDE MAYUR NAMDEV	40
5903	MORE MARUTI KONDIBA	40
5907	VHANVAD SHUKRANA APPASO	40
5908	SURYAWANSHI VIKRAM BAJARANG	44

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6283	ATTAR ARBAJ SHAHANWAJ	45
6284	ATTAR SWALEHA MANSUR	44
6285	DHOBLE SAPNA SUNIL	46
6286	DHOTRE PRATHAMESH VISHNU	48
6287	GHALE POOJA GUNDA	40
6288	JADHAV KRISHNA SUBHASH	42
6289	JADHAV PRITEE RAVINDRA	44
6290	JAGANADE PRITI SUNIL	42
6291	JANGAM POOJA PRABHAKAR	40
6292	KOLI SURAJ SURYAKANT	30
6293	MAHAJAN PURVA PRAVIN	40
6294	MALI NITIN ASHOK	46
6295	MANE MAHESH PANDURANG	44
6296	MORE RIYA PRADEEP	46

6297	PATIL PRATIKSHA GOVIND	42
6298	PATIL SNEHAL LAXMAN	44
6299	PATIL SNEHAL SUDAM	40
6300	PAWAR ROHIT SURYAKANT	42
6301	PAWAR SAISH JANARADAN	44
6302	SAPKAL ANJALI KRISHNA	44
6303	SHENDAGE RUSHIKESH RAVINDRA	40
6304	SURVE PRIYANKA SATISH	42
6305	TAMBOLI AMIR HASAN	44
6306	THORBOLE SAKSHI ASHOK	46

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Roll_No	Name Of The Students	Marks
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5844	CHAVAN VISHWAJEET VINAYAK	46
5151	BEDAGE NEHA POPAT	44



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**Mr. Vijay . T . Kumbhar**  
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