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**Department of Artificial Intelligence and Machine Learning**

**6. Session Plan for experiments with CO mapping**

**a) Regular Experiments**

**Format: 5**

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| **Symbiosis Institute of Technology, Pune** | | | | | | | | | |
| **Session Plan** | | | | | | | | | |
| **Name of the department – AIML** | | | | | | | | | |
| **Name of the course- Unsupervised Learning Lab** | | | | | | | **Credit -** | **1** | |
| **Semester -** | | | **4** | |  | **Batch -** | | **2023-27** |
| **Name of the faculty- Dr. Anupkumar Bongale / Dr. Anjali Dalvi / Dr. Gargi Bhide** | | | | | | | | | |
|  |  |  | |  |  |  | |  |
| **Lect.**  **No** | **Unit No.** | **Points to cover** | | **Methodology** | **Faculty Conducting** | **Lecture/Exp. Learning/Evaluation** | | **CO** |
| 1 | 1 | Implement Dimensionality reduction Techniques - PCA, LDA, t-SNE, MDS, SVD | | Lecture with  interaction,  PPT's demo | Dr. Anupkumar Bongale /  Dr. Anjali Dalvi /  Dr. Gargi Bhide | Lecture and Practical | | CO1 |
| 2 | 1 | Implement Dimensionality reduction Techniques - PCA, LDA, t-SNE, MDS, SVD | | Lecture with interaction, PPT’s demo | Dr. Anupkumar Bongale /  Dr. Anjali Dalvi /  Dr. Gargi Bhide | Lecture and Practical | | CO1 |
| 3 | 1 | Implement Dimensionality reduction Techniques - PCA, LDA, t-SNE, MDS, SVD | | Lecture with interaction, PPT’s demo | Dr. Anupkumar Bongale /  Dr. Anjali Dalvi /  Dr. Gargi Bhide | Lecture and Practical | | CO1 |
| 4 | 1 | Compare the dimensionality reduction techniques outcome | | Lecture with interaction, PPT’s demo | Dr. Anupkumar Bongale /  Dr. Anjali Dalvi /  Dr. Gargi Bhide | Lecture and Practical | | CO1 |
| 5 | 1 | Compare the dimensionality reduction techniques outcome | | Lecture with interaction, PPT’s demo | Dr. Anupkumar Bongale /  Dr. Anjali Dalvi /  Dr. Gargi Bhide | Lecture and Practical | | CO1 |
| 6 | 2 | Execute various k-means, agglomerative, Partitional  Clustering and types, Hierarchical Clustering and types. | | Lecture with interaction, PPT’s demo | Dr. Anupkumar Bongale /  Dr. Anjali Dalvi /  Dr. Gargi Bhide | Lecture and Practical | | CO2 |
| 7 | 2 | Execute k-means clustering | | Lecture with interaction, PPT’s demo | Dr. Anupkumar Bongale /  Dr. Anjali Dalvi /  Dr. Gargi Bhide | Lecture and Practical | | CO2 |
| 8 | 2 | Execute agglomerative  clustering | | Lecture with interaction, PPT’s demo | Dr. Anupkumar Bongale /  Dr. Anjali Dalvi /  Dr. Gargi Bhide | Lecture and Practical | | CO2 |
| 9 | 2 | Execute various Partitional Clustering | | Lecture with interaction, PPT’s demo | Dr. Anupkumar Bongale /  Dr. Anjali Dalvi /  Dr. Gargi Bhide / | Lecture and Practical | | CO2 |
| 10 | 2 | Execute various Hierarchical Clustering and types. | | Lecture with interaction, PPT’s demo | Dr. Anupkumar Bongale /  Dr. Anjali Dalvi /  Dr. Gargi Bhide | Lecture and Practical | | CO2 |
| 11 | 3 | Implement incremental clustering algorithm Density Based Clustering-DBSCAN Algorithm. | | Lecture with interaction, PPT’s demo | Dr. Anupkumar Bongale /  Dr. Anjali Dalvi /  Dr. Gargi Bhide | Lecture and Practical | | CO2 |
| 12 | 3 | Implement incremental clustering algorithm COBWEB | | Lecture with interaction, PPT’s demo | Dr. Anupkumar Bongale /  Dr. Anjali Dalvi /  Dr. Gargi Bhide | Lecture and Practical | | CO3 |
| 13 | 3 | Implement incremental clustering algorithm | | Lecture with interaction, PPT’s demo | Dr. Anupkumar Bongale /  Dr. Anjali Dalvi /  Dr. Gargi Bhide | Lecture and Practical | | CO3 |
| 14 | 3 | Perform comparative analysis to recommend best suitable algorithm for a dataset. | | Lecture with interaction, PPT’s demo | Dr. Anupkumar Bongale /  Dr. Anjali Dalvi /  Dr. Gargi Bhide | Lecture and Practical | | CO3 |
| 15 | 4 | Implement Autoencoders. | | Lecture with interaction, PPT’s demo | Dr. Anupkumar Bongale /  Dr. Anjali Dalvi /  Dr. Gargi Bhide / | Lecture and Practical | | CO4 |

**Textbooks & Reference books/ Beyond Gaps**

| Sr. No. | Text Books | Publication |
| --- | --- | --- |
| 1 | Ian H Witten, Eibe Frank, Mark A Hall, "Data Mining, Lecture and Practical Machine Learning Tools and Techniques" Elsevier, 3rd Edition | Elsevier |
| 2 | Kevin P Murphy "Machine Learning A Probabilistic Perspective", MIT Press, August 2012. | MIT Press |

**Web-Links for Online Notes/ YouTube/NPTEL Videos/Blogs etc**

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| Sr. No. | Web Link | Module |
| 1 | Mathematics for Machine Learning: PCA  https://www.coursera.org/learn/pca-machine-learning | 1 |
| 2 | https://www.kdnuggets.com/2022/09/dimensionality-reduction-techniques-data-science.html | 1 |
| 3 | https://encord.com/blog/dimentionality-reduction-techniques-machine-learning/ | 1 |
| 4 | Clustering Analysis [https://www.coursera.org/learn/clustering-analysis] | 2,3 |
| 5 | https://realpython.com/k-means-clustering-python/ | 2,3 |
| 6 | Encoder-Decoder Architecture  https://www.coursera.org/learn/encoder-decoder-architecture | 4 |

**Names of Magazines, Journals, E-journals**

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| Sr. No. | Journal |
| 1 | Machine Learning, Springer [https://link.springer.com/journal/10994] |
| 2 | Machine Learning with Applications, ScienceDirect [https://www.sciencedirect.com/journal/machine-learning-with-applications] |

**Recommended MOOC Courses like Coursera / NPTEL / MIT-OCW / edX etc**

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| --- | --- | --- | --- | --- |
| Sr .No. | MOOC Course Link | Course Conducted By | Course Duration | Certificate  (Y / N) |
| 1 | Introduction to Machine learning  https://archive.nptel.ac.in/courses/106/106/106106139/ | NPTEL | 08 Weeks | Recommended Course Certification is optional |
| 2 | https://www.coursera.org/learn/encoder-decoder-architecture | Coursera | 1 module | Recommended Course Certification is optional |
| 3 | https://www.coursera.org/learn/ibm-unsupervised-machine-learning | Coursera | 7 modules | Recommended Course  Certification is optional |

**List of Research Articles**

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| **Sr. No.** | **Research Article Title** |
| 1 | S. Nanga *et al.*, “Review of dimension reduction methods,” *J. Data Anal. Inf. Process.*, vol. 09, no. 03, pp. 189–231, 2021. |
| 2 | A. Thakkar, N. Kikani, and R. Geddam, “Fusion of linear and non-linear dimensionality reduction techniques for feature reduction in LSTM-based Intrusion Detection System,” *Appl. Soft Comput.*, vol. 154, no. 111378, p. 111378, 2024. |
| 3 | K. Berahmand, F. Daneshfar, E. S. Salehi, Y. Li, and Y. Xu, “Autoencoders and their applications in machine learning: a survey,” *Artif. Intell. Rev.*, vol. 57, no. 2, 2024. |
| 4. | https://www.researchgate.net/publication/235328198\_Unsupervised\_Learning\_and\_Clustering |