

Tathagata Debnath

(Computational Biology | Data Science | Computer Science)

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EDUCATION

Ph.D. Computer Science with focus on Bioinformatics

Las Cruces, NM | 2018 - Present

NEW MEXICO STATE UNIVERSITY

CGPA: 4.00

- Developing a model-free statistical method named **Pohori** under the supervision of **Dr. Joe Song**, to detect the alternate splicing in short read and long read RNA seq data with potential application in other omics datasets.
- Designed an R package called the **OptCirClust** to calculate optimal clustering solution for circular or periodic data with a poly logarithmic runtime.
- Designing a silhouette-based method called **CircularSilhouette** to detect the number of clusters in the circular or periodic data.
- Applying alternate splicing based differential gene expression detection methods on RNAseq datasets.

M.Tech. Computer Science with focus on Computer Vision

Suryamani Nagar, Tripura, India | 2015 - 2017

TRIPURA UNIVERSITY

CGPA: 9.83 / 10

- Developed an algorithm named **EF-Index** under **Dr. Mrinal K Bhowmik** to detect the number of clusters in an image. The number of clusters information is then used to determine the number of segments present in that image.
- Applied convolutional neural network to classify arthritis in knee joint thermogram dataset.
- Designed a region shrinking based **RASIT** algorithm for accurately segmenting the inflamed area in a thermogram.

B.Tech. Computer Science

Agartala, Tripura, India | 2011 2015

NATIONAL INSTITUTE OF TECHNOLOGY

CGPA: 7.62 / 10

- As the final year project developed an android app **iNITA** for the institution to display the courses offered and ongoing research work from the departments.

WORK EXPERIENCE

NMSU| COMPUTER SCIENCE| NSF | RESEARCH ASSISTANT (RA)

Las Cruces, NM | May 2019 - Present

- Developing algorithms for clustering circular or periodic data.
- Designing an algorithm and a statistical test to detect alternate splicing in long and short-read RNA-seq data.

NMSU| BIOLOGY| NASA | RESEARCH ASSISTANT (RA)

Las Cruces, NM | Sep 2021 - Present

- Implementing bioinformatic pipeline under the guidance of **Dr. Maria G. Castillo** to Align nucleotide sequences obtained from short read RNAseq experiment with a collection of contigs for identifying the TEP genes. The organisms used in this experiment are snail(BBO2), snail cell line (BGE) and Squid(Euprymna Scolopes).
- Setting up a bio-informatic pipeline to detect the differential immune response of p.acuta snails under different conditions in both nuclear genes and mitochondrial genes.
- Generating de novo genome assembly from RNAseq data using **Trinity** for the p.acuta snails.
- Analyzing proteomics data based on snail immune response.

NMSU| COMPUTER SCIENCE | TEACHING ASSISTANT (TA)

Las Cruces, NM | Aug 2018 - May 2021

- Assisted course instructors to grade assignments and students to understand course content.
- Given lectures in the absence of the course instructors.
- Assisted in the CS 372 DATA STRUCTURES AND ALGORITHMS, CS 570 ANALYSIS OF ALGORITHMS, CS 273 MACHINE PROGRAMMING and ORGANIZATION, CS 151 C++, CS 475 ARTIFICIAL INTELLIGENCE 1, CS 172 JAVA courses.

TRIPURA UNIVERSITY | VOLUNTEER RESEARCH ASSOCIATE(RA)

Suryamani Nagar, Tripura, India | Jul 2017 -

Jul 2018

- Assisted in setting up computer vision pipelines for real-time object detection in CCTV footage.
- Applied deep-learning based convolutional neural networks **CNN** on arthritis knee joint thermograms.

PUBLICATIONS

CIRCULAR SILHOUETTE AND A FAST ALGORITHM [↗](#)

Y. Chen, T. Debnath, A. Cai and M. Song, "Circular Silhouette and a Fast Algorithm," in IEEE Transactions on Pattern Analysis and Machine Intelligence, doi: 10.1109/TPAMI.2023.3310495.

FAST OPTIMAL CIRCULAR CLUSTERING AND APPLICATIONS ON ROUND GENOMES [↗](#)

T. Debnath and M. Song, "Fast Optimal Circular Clustering and Applications on Round Genomes," in IEEE/ACM Transactions on Computational Biology and Bioinformatics, vol. 18, no. 6, pp. 2061-2071, 1 Nov-Dec. 2021, doi: 10.1109/TCBB.2021.3077573.

EF-INDEX: DETERMINING NUMBER OF CLUSTERS (K) TO ESTIMATE NUMBER OF SEGMENTS (S) IN AN IMAGE [↗](#)

M. K. Bhowmik, T. Debnath, D. Bhattacharjee, and P. Dutta, "EF-index: Determining number of clusters (K) to estimate number of segments (s) in an image," Image and Vision Computing, vol. 88, pp. 29-40, 2019.

DESIGNING OF AN INFLAMMATORY KNEE JOINT THERMOGRAM DATASET FOR ARTHRITIS CLASSIFICATION USING DEEP CONVOLUTION NEURAL NETWORK. [↗](#)

Bardhan, S., Nath, S., Debnath, T., Bhattacharjee, D., Bhowmik, M. K. (2020). Designing of an inflammatory knee joint thermogram dataset for arthritis classification using Deep Convolution Neural Network. Quantitative InfraRed Thermography Journal, 19(3), 145-171.

RASIT: REGION SHRINKING BASED ACCURATE SEGMENTATION OF INFLAMMATORY AREAS FROM THERMOGRAMS [↗](#)

Bardhan, S., Bhowmik, M. K., Debnath, T., Bhattacharjee, D. (2018). Rasit: Region shrinking based accurate segmentation of inflammatory areas from thermograms. Biocybernetics and Biomedical Engineering, 38(4), 903-917.

CLUSTERS AND SEGMENTS IN AN IMAGE [↗](#)

T. Debnath, M. K. Bhowmik, A. K. Ghosh. Google. (n.d.). Recent trends in Engineering and Technology (NCRTE-2017). Google Books.

SOFTWARE

CIRCULARSILHOUETTE [↗](#)

R, C/C++

R package for calculating silhouette information for clusters on circular or linear data using fast algorithms to determine the number of clusters present inside the data.

OPTCIRCLUST [↗](#)

R, C/C++

R package for fast, optimal, and reproducible clustering algorithms for circular, periodic, or framed data.

FAST OPTIMAL CIRCULAR CLUSTERING [↗](#)

R, C/C++

Code ocean capsule for producing the figures in the "Fast Optimal Circular Clustering and Applications on Round Genomes" paper.

POHORI [↗](#)

R, C/C++

R package for detecting alternate splicing from short read and long read RNAseq data for identifying sub-genetic events responsible for some biological condition. This uses model-free statistical tests to determine the significant events. Possible applications in other omics data. Currently under development.

EF-INDEX [↗](#)

MATLAB, PYTHON

An algorithm to Determine the number of clusters (K) for estimating the number of segments (S) in an image

RASIT [↗](#)

MATLAB, PYTHON

A region shrinking based algorithm for segmentation of inflammatory areas from thermograms.

AWARDS

- Biopattern award at NMSU.
- Ph.D. tuition scholarship at NMSU.
- Gold Medal at M.Tech for becoming the branch topper.
- Gold Medal for getting 100% marks in mathematics on the board exam.

SKILLS

Languages: R, Python, C, C++, Java, Bash, PHP, MATLAB, SQL

Bioinformatic software: Trinity, Samtools, Vcftools, Picard Tools, GATK, BUSCO, Mega, Singularity, Bedtools, RSEM, tabix, gviz, MUMmer4.x, Snapgene, ShinyGO, rMATS, ASpli, DEseq2, DEXseq, Collisto, BBDOCK, G:Profiler, Trimmomatic, Bowtie2

Web Development: HTML/CSS, JavaScript, Ajax

Technology: Git, Docker, \LaTeX , TensorFlow

CERTIFICATIONS

FINDING HIDDEN MESSAGES IN DNA (BIOINFORMATICS I) (WITH HONORS) [↗](#)

Coursera

DEEP LEARNING SPECIALISATION [↗](#)

Coursera

CONVOLUTIONAL NEURAL NETWORKS [↗](#)

Coursera

SEQUENCE MODELS [↗](#)

Coursera

IMPROVING DEEP NEURAL NETWORKS: HYPERPARAMETER TUNING, REGULARIZATION AND OPTIMIZATION [↗](#)

Coursera

STRUCTURING MACHINE LEARNING PROJECTS [↗](#)

Coursera

NEURAL NETWORKS AND DEEP LEARNING [↗](#)

Coursera

ORGANIZATIONAL ACTIVITY

COMPUTER SCIENCE GRADUATE STUDENT ASSOCIATION PRESIDENT | Fall 2020 - Spring 2021

INDIAN STUDENT ASSOCIATION PRESIDENT | Fall 2021 - Spring 2022

COMPUTER SCIENCE GRADUATE STUDENT ASSOCIATION VICE PRESIDENT | Fall 2019 - Spring 2020

INDIAN STUDENT ASSOCIATION VICE PRESIDENT | Fall 2020 - Spring 2021

ACADEMIC ACTIVITY

- Paper review for Springer Nature.
- Paper review for IEEE BIBM.