Name: Soumya Sanyal User ID: sanyal.soumya8@gmail.com

CONTACT INFORMATION

MALL Lab, CDS
Inidan Institute of Science, Bangalore

Email: sanyal.soumya8@gmail.com
Website: soumyasanyal.github.io

RESEARCH INTERESTS

I am broadly interested in Deep Learning on Graphs and Natural Language Processing. My recent research has focused on learning and inference over graphs, knowledge graph completion and representation learning of molecules and materials.

EDUCATION

Indian Institute of Technology, Kharagpur, India — 2012 – 2016
B.Tech in Electronics and Electrical Communication — CGPA: 8.98/10
Minor in Computer Science — CGPA: 8.92/10

REFEREED CONFERENCE PROCEEDINGS

[1] Soumya Sanyal*, Shikhar Vashishth*, Vikram Nitin, Nilesh Agrawal, and Partha Talukdar. **InteractE: Improving Convolution-based Knowledge Graph Embeddings by Increasing Feature Interactions**. *Thirty-Fourth AAAI Conference on Artificial Intelligence (AAAI-20), New York, USA*. [Paper | Code]

[2] Ekagra Ranjan, Soumya Sanyal, and Partha Talukdar. **ASAP: Adaptive Structure Aware Pooling for Learning Hierarchical Graph Representations**. *Thirty-Fourth AAAI Conference on Artificial Intelligence (AAAI-20), New York, USA*. [Paper]

REFEREED WORKSHOP PAPERS

[3] Soumya Sanyal, Janakiraman Balachandran, Naganand Yadati, Abhishek Kumar, Padmini Rajagopalan, Suchismita Sanyal, and Partha Talukdar. **MT-CGCNN: Integrating Crystal Graph Convolutional Neural Network with Multitask Learning for Material Property Prediction**. *NeurIPS 2018 Workshop on Machine Learning for Molecules and Materials*, Montreal, Canada. [Paper | Code]

PREPRINTS

[4] Soumya Sanyal*, Shikhar Vashishth*, Vikram Nitin, and Partha Talukdar. **Composition-based Multi-Relational Graph Convolutional Networks**. *(currently under submission at ICLR 2020)* [Paper]

[5] Zhiqing Sun*, Shikhar Vashishth*, Soumya Sanyal*, Partha Talukdar, and Yiming Yang. **A Re-evaluation of Knowledge Graph Completion Methods** . [Paper]

EMPLOYMENT

Indian Institute Science, Bangalore, India — Aug 2018 – Present
Research Assistant, MALL Lab
Hosted by *Prof. Partha Talukdar*, Department of Computational and Data Sciences, IISc (supported by Shell grant). Worked on graph neural networks and its applications in knowledge graph completion, protein modeling and material discovery.

Goldman Sachs Services Private Limited, Bangalore, India — Jun 2016 – Jul 2018
Senior Analyst, Equities Risk Management
Part of the global team responsible for developing and managing the risk infrastructure of the equities desk. Worked on financial risk modeling, risk engines and risk monitoring.

RESEARCH PROJECTS

InteractE: Improving Convolution-based Knowledge Graph Embeddings by Increasing Feature Interactions
Advisor: Prof. Partha Talukdar, IISc — Jan 2019 – Mar 2019

- Accepted as a long paper in AAAI 2020.
- Established that increasing feature interactions improves KG Link Prediction performance.
- Proposed a method that systematically increased interactions between node and relation embeddings and achieved superior performance on multiple Knowledge Graph datasets.

ASAP: Adaptive Structure Aware Pooling for Learning Hierarchical Graph Representations
Advisor: Prof. Partha Talukdar, IISc Jun 2019 – Aug 2019

- Accepted as a long paper in AAAI 2020.
- Designed a sparse, hierarchical pooling operator for graphs that used attention to effectively cluster the nodes for graph pooling.
- Proposed a novel graph convolution formulation that captures local extremum information in a neighborhood enabling selection of important nodes while pooling.
- Achieved state of the art performance on 5 graph classification datasets.

Composition-based Multi-Relational Graph Convolutional Networks
Advisor: Prof. Partha Talukdar, IISc Apr 2019 – May 2019

- Under submission in ICLR 2020.
- Proposed a generalized graph neural network framework for multi-relational graphs that can leverage existing Knowledge Graph embedding techniques.
- Demonstrated the effectiveness of the formulation on multiple node classification, graph classification, and link prediction datasets.

ProteinGCN: Protein model quality assessment using Graph Convolution networks
Advisors: Prof. David Baker, University of Washington and
Prof. Partha Talukdar, IISc Feb 2019 – Present

- Formulating a graph neural network to accurately estimate the quality of protein models.
- Work done in collaboration with The Baker Lab, University of Washington.

Accurate and transferable deep learning models to predict potential energy surface of crystals: A case study on Alumina polymorphs
Advisors: Prof. Umesh Waghmare, JNCASR and
Prof. Partha Talukdar, IISc Dec 2018 – Nov 2019

- Developed a graph neural network that effectively models Potential Energy Surfaces of crystals.
- Studied transferabilty of the model across scales, environmental conditions (temperature), and different crystallographic polymorphs.
- Work done in collaboration with Shell, Bangalore, India.

MT-CGCNN: Integrating Crystal Graph Convolutional Neural Network with Multitask Learning for Material Property Prediction
Advisor: Prof. Partha Talukdar, IISc Aug 2018 – Nov 2018

- Published in NeurIPS 2018 workshop on Machine Learning for Molecules and Materials.
- Proposed a graph neural network based multi-tasking framework that effectively predicts multiple material properties.
- Work done in collaboration with Shell, Bangalore, India.

Plagiarism detection in programming codes using Tree kernel methods
Advisor: Prof. Pawan Goyal, IIT Kharagpur Sep 2015 – Nov 2015

- Implemented a subtree matching algorithm that utilized Abstract Syntax Tree of codes to detect plagiarism.
- Collaborated with 6 members and secured a top 5 position among 29 teams in NLP term project. [Slides | Code]

Skills

Languages: Python, C++, C, Java, R, JavaScript, AJAX, NodeJS, MatLab, bash
DL Frameworks: Pytorch, Tensorflow, Keras

Honors and Awards

Shell travel grant for attending NeurIPS 2018, Montreal, Canada	**2018**
Secured 617 rank (among approximately 0.50 million aspirants) in IIT-JEE	**2012**
Awarded KVPY scholarships, granted to approximately top 300 meritorious students	**2012**
Was in top 1% of total aspirants in National Standard Examination in Physics (NSEP)	**2011**
Was in top 1% of total aspirants in National Standard Examination in Astronomy (NSEA)	**2011**
3^{rd} rank among 10,000 students in Inter DPS Science & Mathematics Talent Search Exam	**2009**
Awarded National Talent Search Examination (NTSE) Scholarship by NCERT	**2008**