

# Umang Gupta

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## Education

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### University of Southern California (USC), Los Angeles

Ph.D. in Computer Science

Advisor: Prof. Greg Ver Steeg, Information Sciences Institute USC

2017 - Present

Current GPA: 3.81/4

### Indian Institute of Technology Delhi (IIT Delhi), India

B.Tech & M.Tech (Dual Degree), Electrical Engineering (Silver Medalist)

Thesis: Image Classification with Ontology and Deep Learning

Advisor: Prof. Santanu Chaudhury, Dept. of Electrical Engineering, IIT Delhi

2010 - 2015

GPA: 8.9/10

## Publications

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### Journal & Conference Publications

**Umang Gupta**, Aaron Ferber, Bistra Dilkina, Greg Ver Steeg

Controllable Guarantees for Fair Outcomes via Contrastive Information Estimation

*AAAI 2021*

Dimitris Stripelis, Hamza Saleem, Tanmay Ghai, Nikhil Dhinagar, **Umang Gupta** and Others

Secure Neuroimaging Analysis using Federated Learning with Homomorphic Encryption

*International Symposium on Medical Information Processing and Analysis (SIPAIM) 2021*

**Umang Gupta**, Dimitris Stripelis, Pradeep Lam, Paul Thompson, José Luis Ambite, Greg Ver Steeg

Membership Inference Attacks on Deep Regression Models for Neuroimaging

*Medical Imaging with Deep Learning (MIDL) 2021*

**Umang Gupta**, Pradeep Lam, Greg Ver Steeg, Paul Thompson

Improved Brain Age Estimation with Slice-based Set Networks

*IEEE International Symposium on Biomedical Imaging (ISBI) 2021*

Nitin Kamra, **Umang Gupta**, Kai Wang, Fei Fang, Yan Liu, Milind Tambe

DeepFP for Finding Nash Equilibrium in Continuous Action Spaces

*International Conference on Decision and Game Theory for Security (GameSec) 2019*

Nitin Kamra, **Umang Gupta**, Fei Fang, Yan Liu, Milind Tambe

Policy Learning for Continuous Space Security Games using Neural Networks

*AAAI 2018*

Abhisek Datta, Anwesh Mazumdar, **Umang Gupta**, Saskia Hekker

Automated Determination of g-mode Period Spacing of Red Giant Stars

*Monthly Notices of the Royal Astronomical Society 2014*

**Umang Gupta**, Santanu Chaudhury

Deep Transfer Learning with Ontology for Image Classification

*NCVPRIPG (IEEE) 2015*

**Umang Gupta**, Niladri Chatterjee

Personality Traits Identification Using Rough Sets based Machine Learning

*International Symposium on Computational and Business Intelligence (IEEE) 2013*

### Preprints

Ninareh Mehrabi, **Umang Gupta**, Fred Morstatter, Greg Ver Steeg, Aram Galstyan

Attributing Fair Decisions with Attention Interventions

<https://arxiv.org/abs/2109.03952>

Nitin Kamra, **Umang Gupta**, Yan Liu

Deep Generative Dual Memory Network for Continual Learning

<https://arxiv.org/abs/1710.10368>

### Workshop & Others

Aaron Ferber, **Umang Gupta**, Greg Ver Steeg, Bistra Dilkina

Differentiable Optimal Adversaries for Learning Fair Representations

*IJCAI AI for Social Good Workshop 2020*

Nitin Kamra, **Umang Gupta**, Kai Wang, Fei Fang, Yan Liu, Milind Tambe  
Deep Fictitious Play for Games with Continuous Action Spaces  
*International Conference on Autonomous Agents and MultiAgent Systems (AAMAS) 2019*

Sungyong Seo, **Umang Gupta**, Jiageng Zhu, Jeffrey Brantingham, Yan Liu  
Contextual Understanding of Homicide Reports in Los Angeles County  
*SoCal NLP Symposium 2019*

## Selected Projects

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- Information-Theoretic Measures for Privacy & Fairness** Jul'19 - Present  
*Controlling Fairness via Mutual Information Minimization*
- Characterized an information-theoretic measure for statistical parity, a popular fairness measure
  - Demonstrated an effective method for controlling fairness through contrastive mutual information estimation
  - Showcased **better fairness-accuracy trade-offs** compared to recent competitive baselines
- Minimizing Privacy Leakage during Training of the Neural Networks*
- Illustrated realistic ways to extract private information from the models trained via federated learning
  - Investigating techniques to assure data-privacy while training neural networks with applications to 3D-Neuroimaging
- Continual Learning with Neural Networks** Aug'17 - Jan'18  
*Best Theory Project Award, CSCI-599: Deep Learning, USC (2017)*
- Proposed dual generative (memory) models to solve the problem of catastrophic forgetting
  - Inspired from learning mechanism in humans which also has two generative memories — long term & short term
  - Demonstrated better retention when learning from non-iid, sequentially arriving samples

## Teaching Experience

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- Teaching Assistant, USC*
- Machine Learning, CSCI567 (Summer 2020, Summer 2019, Spring 2018)
  - Applied Natural Language Processing, CSCI544 (Spring 2019)
  - Software Engineering, CSCI310 (Fall 2017)
- Teaching Assistant, IIT Delhi*
- Pattern Recognition, EEL709 (Spring 2015)
  - Digital Signal Processing, EEL319 (Fall 2014)
  - Circuit Theory, EEL202 (Fall 2013)

## Work Experience

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- Amazon Alexa-AI (Manager - Rahul Gupta)** May'21 - Aug'21  
*Applied Scientist Intern*  
Proposed finetuning approaches for deriving fair language models from pretrained language models
- Huawei Research, Santa Clara, CA** Jun'18 - Aug'18  
*Research Intern*  
Investigated reinforcement learning algorithms for end-to-end training of seq2seq dialogue models
- Visa Inc., Bangalore, India** Aug'15 - Jul'17  
*Senior Software Engineer (User-Interface)*  
Worked on UI development using BackboneJS and ReactJS; Received excellent rating during year-end review
- LCI Lab, University of British Columbia, Vancouver, Canada** May'14 - Jul'14  
*MITACS Research Intern*  
Engineered tool for labeling human motion in video [\[Github Demo\]](#)
- Amagi Media Labs, Bangalore, India** May'13 - Jul'13  
*Software Development Intern*  
Automated detection of video-splicing errors using signal processing techniques; saved substantial manual efforts
- Sohum Innovation Labs, Delhi, India** May'12 - Dec'12  
*Intern*  
Investigated hardware for EEG signal acquisition for early detection of hearing impairments in infants

## Awards and Honors

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| Program | Recipient of IITD Semester Merit Award for 4 of 8 semesters, 2010 - 2015 |
| Rank 1  | Highest GPA in Dual Degree Program, Department of Electrical Engineering |

Hackathons	First Prize, GS Quantify 2014, annual computing competition organized by Goldman Sachs First Prize, Bing Hackathon 2016, machine learning contest organized by Microsoft Bing
Best Essay	Among top 20 National Winners, International Year of Forest, 2011 certification program
NIUS 2011	Among 30 students invited to research at HBCSE, Mumbai under National Initiative for Undergraduate Science (NIUS) program
Competitive Exams	Recipient of KVPY scholarship 2010, Dept. of Science and Technology, Govt. of India Among top 1% in Physics (NSEP); Astronomy (NSEA); Chemistry (NSEC) Olympiads 2009 Secured All India Rank 410 in IIT-Joint Entrance Exam among 0.5 million candidates

## Technical Skills

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Programming Languages	python, C, shell-scripts (awk/sed/bash), javascript, java
Softwares	PyTorch, TensorFlow, ReactJS, BackboneJS, NodeJS
Relevant coursework	( <b>USC</b> ) Natural Language Processing, Deep Learning, Advanced Topics in Deep Learning, Learning & Game Theory, Statistical Methodology & Machine Learning, Information Extraction  ( <b>IITD</b> ) Computer Vision, Probabilistic Graphical Models, Machine Learning, Signal Theory, Statistical Methods, Numerical Optimization, Scientific Computing, Coding Theory, Detection & Estimation Theory, System Software, Econometric Methods, Algorithms