

# Ishika Singh

PH.D. STUDENT · COMPUTER SCIENCE · USC

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## Education

### University of Southern California

PHD IN COMPUTER SCIENCE

Advisor: Jesse Thomason

Los Angeles, CA

2021

### Indian Institute of Technology (IIT) Kanpur

B.TECH, DOUBLE MAJOR IN COMPUTER SCIENCE AND CHEMICAL ENGINEERING

India

2016 - 2021

## Achievements & Awards

2021	<b>USC Graduate Fellowship</b> , for 1 year of the Ph.D. program	USA
2020	<b>Adobe India Women in Technology Scholarship</b> , 5 undergrad/masters awardees nation-wide	India
2019-20	<b>Academic Excellence Award</b> , for both majors, given to <b>top 10%</b> students in the department	India
2019	<b>Grand Prize</b> , worth 6,800 USD, <b>Deloitte TechnoUtsav 2.0</b> AI competition, <b>1<sup>st</sup></b> in 9.5K+ contestants	India
2016	<b>99.75 percentile</b> , in 1.2M+ examinees in <b>IIT-JEE Mains</b> , <b>top 3%</b> in 0.2M+ examinees in <b>IIT-JEE Advanced</b>	India

## Publications

**Research Interests:** RoboNLP, Embodied AI, Robot-Learning, Vision Language Navigation

### Pre-trained Language Models as Prior Knowledge for Playing Text-based Games

ISHIKA SINGH, GARGI SINGH, ASHUTOSH MODI

Under review

[arXiv]

### Checking Claims in a Document Against a Corpus

ISHIKA SINGH, VIPUL SHANKHPAL, BALDIP BIJLANI, PRIYANSHU GUPTA, NAVITA GOYAL, ANANDHAVELU N

Patent Application.

Adobe Research.

### Adapting a Language Model for Controlled Affective Text Generation

ISHIKA SINGH\*, AHSAN BARKATI\*, TUSHAR GOSWAMY, ASHUTOSH MODI

COLING'20

[arXiv / Talk]

In *28th International Conference on Computational Linguistics 2020* (Long Paper, Oral)

Appeared at *Wordplay: When Language Meets Games @ NeurIPS 2020*

### Differentially-private Federated Neural Architecture Search

ISHIKA SINGH\*, HAoyi ZHOU\*, KUNLIN YANG, MENG DING, BILL LIN, PENGTAO XIE

FL-ICML'20

[arXiv]

Appeared at *Federated Learning for User Privacy & Data Confidentiality @ ICML 2020* (Long Presentation)

## Research Experience

### Interactive Fiction Games (IFG)

PROJECT, UNDER PROF. ASHUTOSH MODI

IIT Kanpur

Jan - Jul'21

- Identified the semantic and common world knowledge bottleneck for IFG agents. Paper under review.
- Ideated an integration of pre-trained language model to traditional game agents as a linguistic prior.
- Achieved new state-of-the-art scores on 4 out of 14 games tested, while performing comparably on the remaining set.

### Claim Verification - Information Retrieval and Reasoning

Adobe Research, Bangalore

RESEARCH INTERN, BIG DATA LABS

Apr - July'20

- Formalized conditional Information (Evidence) Retrieval for sophisticated claims; achieved 3-fold accuracy improvement.
- Remodeled graph attention networks for improved reasoning on nearly complete evidence set in not-enough-info class.
- Enhanced accuracy by enabling feedback across modules via a joint reasoning and evidence selection module.
- Evaluated the model for different types of claims and via ablations. Patent under review.

### Affective Language Modeling and Text Generation

IIT Kanpur

COURSE PROJECT, NLP, UNDER PROF. ASHUTOSH MODI

Jan - Dec'20

- Ideated and developed an attribute model for generating affect-driven language with 8 classes and affect intensity control.
- Conceptualized robust incorporation of affect intensity without degrading generated text's grammatical correctness.
- Statistically analyzed model performance via extensive automated and human evaluations. Work accepted at COLING'20.
- Extending work to an application in affective human-robot dialogue and robot-learning via emotion-based feedback.

## Differentially Private (DP) Neural Networks Optimization

UC San Diego

PROJECT, UNDER PROF. PENGTAO XIE

Jan - May'20

- Theoretically analyzed DP and convergence for general non-convex objectives and neural network loss objectives.
- Theorized first-ever privacy analysis for Federated Neural Architecture Search (FNAS). Work accepted at FL-ICML'20.
- Extended work with a convergence analysis of DP-FNAS; paper under review.

## Intelligent Energy Harvesting - Cognitive Automation Space [ [slides](#) ]

Hyderabad, India

COMPETITION, DELOITTE US INDIA

Mar - May'19

- Created an 82%-accurate power load predictor on renewable energy sources using the weather data.
- Envisioned an automated and efficient integration of these erratic sources to conventional ones using the above model.
- Awarded with the Grand Prize at Deloitte TechnoUtsav2.0 and showcased it at US India Analytics Summit 2019, Deloitte.

## Predicting Web Browsing Patterns - A Recommender System Extension

IIT Kanpur

PROJECT, UNDER PROF. NISHEETH SRIVASTAVA

Aug - Dec'19

- Built web scrapers in Python to scrape intended data from Wikipedia, Google search results, page sources, etc.
- Examined meta-data related to web-pages and built keyword representations for the URLs in the web browsing history.
- Implemented a topic model using hierarchical clustering and analyzed the topic switch trends.

## Stochastic Algorithms for Minimax Optimization [ [Report](#) ]

IIT Kanpur

COURSE PROJECT, OPTIMIZATION FOR BIG DATA, UNDER PROF. KETAN RAJAWAT

Aug - Nov'19

- Theoretically proved uncertainty in convergence of minimax Stochastic variant of Accelerated Gradient Descent (SAGD).
- Proposed and proved the convergence of 2 stochastic algorithms for non-smooth convex-concave minimax problems.
- Utilized the above to formulate the stochastic version of a non-convex-concave smooth minimax optimization algorithm.

## Skills

<b>Operating Systems</b>	Linux, macOS, Windows
<b>Programming Languages</b>	Python, C/C++, Excel VBA, Verilog
<b>Tools / Environments</b>	BeautifulSoup, NLTK, PyTorch, OpenCV, CoreNLP / Jericho, Habitat
<b>Miscellaneous</b>	MATLAB/GNU Octave, WebSim, Docker, Git, $\LaTeX$ , HTML, CSS, Web Scrapping
<b>Languages</b>	English (Proficient), Hindi (Native), Spanish (Beginner)

## Work Experience

**Unilever** | SUPPLY CHAIN INTERN, LAKME LEVER PVT. LMT. (LLPL) UNIT

May - Jul'19 | **Mumbai, India**

- Predicted temperature rise throughout the plant on perturbations by analyzing the plant behaviour using historical data.
- Suggested changes to boost Distilled Fatty Acid (DFA) production from 700 to 900 Tons/week for Lux/Lifeboy production.
- Business Impact: Unlocking DFA plant's capacity at LLPL to reduce load at other units will address a saving of 15M/year.

**WorldQuant Research, India** | RESEARCH CONSULTANT

Jun - Oct'19 | **Remote**

- Selected as a Research Consultant (RC) for outstanding alpha-building skills in Alphathon to join top 2.8K RC's worldwide.
- Formulated 600+ In Sample and 11 Out Sample alphas on WebSim using global market data from USA, Europe and Asia.
- Participated in international-level competitions: Women Who Quant, International Quant Championships, etc.

**Human Activity Recognition, Wellnesys Technologies** | AI RESEARCH INTERN

Nov - Dec'18 | **Bangalore, India**

- Researched human activity recognition using IMU sensors in wearable devices and a pressure sensitive yoga mat.
- Engineered features in time and frequency domains; filtered them using component decomposition methods.
- Trained a 99.9%-accurate 2-stage prediction model using CNN followed by Naive Bayes posture classifier.

**Quantitative Trading Strategy Modelling, Auquan** | TRAINEE & PROJECT INTERN

Feb - May'18 | **Remote**

- Implemented trading strategies on real stock data: momentum, mean reversion, pair, long-short trading using ranking.
- Classified 15 momentum stocks from 110 National Stock Exchange stocks using Hurst value and price movement direction.
- Predicted future price movements using decision tree algorithm on 6 features: price-volume trend, moving averages, etc.

## Leadership & Community Service

**Brain and Cognitive Society [BCS]** | LEADER

Mar'20 - Apr'21 | **IIT Kanpur**

- Mentored 20+ freshmen for 3 summer projects pertaining to natural language processing and reinforcement learning.
- Provided resources such as research opportunity information to freshmen to ease their process of entering into research.
- Organized campus-wide journal clubs & talks on interesting research topics by PhD students from UCB, MILA, UUtah, etc.

**Counselling Service** | ACADEMIC MENTOR

Mar'17-Apr'18 | **IIT Kanpur**

- Mentored 30+ students in math courses - Real Variable Calculus, Linear Algebra, ODE - through institute level lectures.
- Provided one-to-one mentoring to freshmen facing academic difficulties.
- Volunteered to teach Mathematics to 10+ underprivileged Class 10th students at the Community Welfare Cell, IIT Kanpur.