



Sidak Pal Singh

Education

- 2017 - 2019 **MSc Data Science**, *École Polytechnique Fédérale de Lausanne (EPFL), Switzerland*.
Awarded **Research Scholarship** to cover tuition fees and living expenses. GPA: 5.86/6
- 2013 - 2017 **B.Tech Computer Science**, *Indian Institute of Technology (IIT) Roorkee, India*.
Department Medal for best project & ranked amongst **top 5%** with CGPA: 9.27/10

Award & Honors

- 2018 **FAIR, Amazon, & Salesforce Research**, Selected for research internship positions.
- 2018 **Machine Learning for Programming**, *Oxford, UK*, Student grant to attend ML4P workshop.
- 2017 **The Alan Turing Institute, London, UK**, Data Study Group: Health & Well-being.
- 2017 **Microsoft Research (MSR), India**, Selected for the fulltime Research Fellow position.
- 2016 **Honda Y-E-S (Young Engineer & Scientists) Award, Y-E-S Plus Award**, 10,000 \$, Received financial support to pursue research in Japan (14 students selected all over India).
- 2016 **Google Venkat Panchapakesan Scholarship**, 750 \$, Invited to visit Google & YouTube Headquarters, USA (6 students selected all over India).
- 2016 **Google Microgrant**, 225 \$, Awarded funding for starting Machine Learning Reading Group.

Publications

- ArXiv **Sidak Pal Singh**, Andreas Hug, Aymeric Dieuleveut & Martin Jaggi.
Is Wasserstein all you need? Under submission to ICLR, 2018.
- ICWS Rohit Ranchal, **Sidak Pal Singh**, Pelin Angin, Ajay Mohindra, Hui Lei & Bharat Bhargava.
RaaS and Hierarchical Aggregation Revisited. 24th IEEE International Conference on Web Services, Honolulu, USA, 2017.
- IJCAI **Sidak Pal Singh**, Sopan Khosla, Sajal Rustagi, Manisha Patel, Dhaval Patel.
SL-FII: Syntactic and Lexical Constraints with Frequency based Iterative Improvement for Disease Mention Recognition in News Headlines. Workshop on Bioinformatics & Artificial Intelligence, 25th International Joint Conference on Artificial Intelligence, 2016. **(Oral)**

Experience & Projects

- Sep 2018 - **Research Intern**, *Facebook AI Research (FAIR)*, Menlo Park, CA, USA.
- Feb 2019 ○ Working on latent variable models for text generation, with [Micheal Auli](#) and [Angela Fan](#).
- Sep 2017 - **Research Assistant**, *Machine Learning & Optimization Lab, EPFL*, Lausanne, Switzerland.
- Aug 2018 ○ Proposed a novel method to represent each entity (e.g., a word) as a *distribution over its contexts*, with the contexts themselves endowed in a metric space, which allows us to utilize tools from **Optimal Transport**. This representation can better capture uncertainty & polysemy, and provides for interpretability via optimal transport map.
- Introduced the **Context Mover's Distance (CMD)** which can be used to measure any kind of distance between entities, by considering a suitable ground cost, leading to a *state of the art for word entailment*.
- Extended this method to form representation of composition of entities (e.g., a sentence) by using **Wasserstein Barycenter**, which proves as a competitive method for use in sentence similarity tasks.
- Resulted in a publication, *Is Wasserstein all you need?* (Advisor: [Prof. Martin Jaggi](#).)

- Jul 2017 - **Deep Learning Intern**, *Ambient.ai*, Palo Alto, USA.
- Sep 2017
- Built an experiment and infrastructure management platform with support for distributed setting, for use in Deep Learning. (*Flask, SQLAlchemy, Nvidia-Docker, Supervisor*)
 - Developed a state of the art object detection system, specialized for recognizing small objects, in TensorFlow. (Details under NDA)
- May 2016 - **Machine Learning Research Intern**, *Kyoto University*, Kyoto, Japan.
- Jul 2016
- Guide: [Prof. Marco Cuturi](#).
- Designed a loss function for training Generative Adversarial Networks (**GANs**) based on *Entropy Regularized Wasserstein* distances.
 - Learned the ground metric using Large Margin Nearest Neighbor (**LMNN**) on the feature activations obtained from the “Network in Network” pretrained convolutional neural network and visualized its working using *t-SNE*.
 - Implemented the system using *Chainer* neural network library in *Python*, with the generator network based on *DCGAN* architecture.
- May 2015 - **Summer Intern**, *Purdue University*, West Lafayette, USA.
- Jul 2015
- Guide: [Prof. Bharat Bhargava](#). [\[paper\]](#) [\[github\]](#)
- Designed and implemented a method to estimate the relevance of reviews using their metadata, with a particular focus on reviews with limited votes. Performed experiments on a data of over *10,000* reviews scraped from Amazon.com
 - Implemented consumer *Rating as a Service* (RaaS) architecture and provided a *RESTful API* for interaction, which were written using *Node.js* and *Express* with *MongoDB* for persistence.
- Feb 2016 - **Research Assistant**, *IIT Roorkee*, Roorkee, India.
- Apr 2016
- Guide: [Prof. Dhaval Patel](#). [\[paper\]](#) [\[github\]](#)
- Utilized lexical and syntactic constraints to identify a set of significantly covering word roots that signal disease mentions and extract the occurrence pattern of diseases in sentences.
 - Designed a method to weed out false positives, by using past experience gained in recognizing disease mentions with different word roots.
 - Extracted a total of *5058* correct disease mentions, *2.5x* more than disease mentions obtained from the annotations simulated using a manually prepared list of 95 diseases.
- Dec 2015 - **Winter Intern**, *Xerox Research Centre*, Bangalore, India.
- Jan 2016
- Guide: [Dr. Koyel Mukherjee](#). [\[github\]](#)
- Developed prototype of a multimodal trip planning system that integrates dynamic ridesharing with scheduled transportation services.
 - Used *k-medoids* algorithm to find clusters of landmarks in road network graph. Implemented a variant of *hill climbing algorithm & silhouette analysis* to find the optimal number of clusters.
 - Lead to a *12x* improvement in running time, using the formulated heuristics for computing all-pair road network distances.

Other Projects

- May 2018 **Toy-PyTorch: Neural Networks library from scratch.**
- Implemented a mini deep learning framework from scratch by relying only on `torch.Tensor`. Obtained a better understanding of the entire pipeline of training neural networks with backpropagation. [\[code\]](#)
- Nov 2017 - **Aerial Image Segmentation using U-Net.**
- Dec 2017
- Developed a fully convolutional approach based on the U-Net architecture that **won the in-class Kaggle** competition at EPFL. Experimented with various data augmentation techniques like random noise, crops, flips, rotations to build invariance against such transformations. Utilized Dropout and Weight Decay for regularization. [\[report\]](#)
- Nov 2017 - **Markov Chain Monte Carlo for Ising Perceptron .**
- Dec 2017
- Designed a Metropolis-Hastings based Markov Chain to model the perceptron classification problem. Used simulated annealing for optimal choice of parameters & reaching closer to global minima. [\[report\]](#)
- September 2017 **Inferring Patient Risk from Mammography using Transfer Learning.**
- Employed a pre-trained Inception_v3 and adapted the last-2 layers for the application at hand. Visualized Attention Maps to understand the working of internal CNN layers. [\[slides\]](#)

Visit <https://github.com/sidak?tab=repositories> for a full and detailed list of projects.

Relevant Courses

Graduate	Deep learning, Optimization for Machine Learning, Advanced Algorithms, Statistics for data science, Markov chains and algorithmic applications, Information theory and signal processing.
Undergraduate	Machine Learning, Artificial Intelligence, Advanced Graph Theory, Theory of Computation, Data Structures and Algorithms, Principles of Programming Languages.

Positions of Responsibility & Extra Curriculars

Volunteer	Selected to serve as a student volunteer during NIPS , Long Beach, USA. (2017)
Founder & Organizer	Started the Machine Learning Reading Group (MLRG) in IIT Roorkee, to bring together people interested in ML, NLP & Vision to discuss latest research and developments. (2016)
Mentorship	Guided 10 first-year undergraduates towards a holistic development academically as well as socially. Received Star Mentor Award (2015)

Technical skills

- **Languages:** C/C++, Python, Java, Javascript, Node.js
- **Software Packages:**
 - *ML:* PyTorch, TensorFlow, Chainer, scikit-learn, Shogun, NLTK, Numpy, Scipy
 - *Others:* Docker, Flask, MySQL, MongoDB, Express, Git, Android, L^AT_EX
- **Operating Systems:** GNU/Linux, macOS, Windows