# Rishab Khincha

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## Education

### The University of Texas at Austin
M.S. Computer Science | Aug 2021 – May 2023
Coursework: Advanced Topics in CV, NLP. TA: Advanced ML

### BITS Pilani
B.E. Computer Science, M.Sc. Physics | Aug '16–Jun '21
GPA 9.35/10, Awarded the Institute Merit Scholarship

## Skills

C/C++, Java, Python, MySQL, CSS, HTML5, Tensorflow, Pytorch, Keras, BPMN, REST API

## Experience

**MIT Media Lab** | Research Affiliate (Remote)
Boston, MA | Jun 2020 – April 2021
*Advised by Prof. Pattie Maes*

Built robust, multi-modal ensemble methods using novel acoustic, pause, and intervention features for severity prediction of Alzheimer's Dementia. Our proposed ensemble methods [P1, P2] not only beat existing SOTA methods but also provided more reliable and trustworthy predictions, disentangling the uncertainty estimates from different modalities.

**Goldman Sachs** | Software Engineering Intern
Bangalore, India | May 2020 – Jun 2020

Wrote REST APIs in Java and created BPMN workflows to build a loan reconciliation application that escalates inconsistencies in the database to the operation team as an eTask. Worked with multiple technical and operations teams for the successful integration of the app.

**RIKEN** | International Program Associate (Remote)
Wako, JP | Feb 2021 – July 2021
*Advised by Dr. Franco Nori, Dr. Clemens Gneiting*

Studied the noise robustness of analog optimization methods for NP-Hard problems and built mathematical models to understand how the behavior scales with the problem sizes (up to $10^3$ spins).

**APP Center for AI Research** | Student Researcher
Goa, India | Jan 2020 – Jun 2021
*Advised by Prof. Ashwin Srinivasan, Dr. Lovekesh Vig*

Built ResNet, DenseNet, and UNet models using Tensorflow for medical imaging tasks, improving the existing SOTA in tumor classification [P5] and lung disease identification [P4]. Worked with a team of doctors and scientists to understand how AI models and explanations can be trusted by clinicians [P3].

## Selected Projects [Github]

### Risk Stratification of Alzheimer's Dementia (AD)
*MIT Media Lab | Prof. Pattie Maes*

Built an open-source platform for modeling risk stratification of AD using spontaneous speech features. Proposed Deep Split Ensembles [P2] and UA Ensembles [P1] where we beat existing SOTA while disentangling the predictive uncertainties and reducing the system's entropy.

### Constructing and Evaluating an Explainable Model for COVID-19 Diagnosis
*TCS Research & BITS Goa | Prof. Ashwin Srinivasan*

Worked with a radiologist to build a new COVIDr dataset with critical radiological annotations and to understand the clinical efficacy of visual and textual explanations through a web interface. Constructed a neuro-symbolic model to extract domain-specific features from chest X-rays using DNNs, and a decision tree for diagnosing COVID-19 using these features. [P3]

### Deep Diagnosis of COVID-19 from Chest X-rays
*TCS Research | Prof. Ashwin Srinivasan, Dr. Lovekesh Vig*

Built a UNet model to isolate the lungs region from the rest of the chest and built a model to detect COVID-19 from the segmented lung. Employed embeddings of disease symptoms produced by the CheXNet network and created an ensemble to assist the model in classification [P4]. Prime Minister's office is interested in using this tool for mass screening in airports and railway stations.

### Robustness to Missing Features using Split NNs
*MIT Media Lab | Prof. Pattie Maes*

Used hierarchical clustering to cluster similar features and then trained split neural networks with a joint loss. We showed promising improvements on benchmark regression datasets even with simple imputation techniques like mean imputation [P6].

### Social Networks-based Telegram Chatbot
*BITS Goa | Prof. Neena Goveas*

Built a platform-agnostic Python interface that scrapes chat data, classifies users(experts/users), and suggests experts and timings for various topics extracted from the chat. [P7]

## Selected Publications [Google Scholar]

[P1] Uncertainty-Aware Boosted Ensembling in Multi-Modal Settings
U Sarawgi*, R Khincha*, W Zulfikar*, S Ghosh, P Maes
ML4H Workshop NeurIPS 2020, IJCNN 2021 [*Paper* | *Talk*]

[P2] Why have a Unified Predictive Uncertainty? Disentangling it using Deep Split Ensembles
U Sarawgi, W Zulfikar, R Khincha, P Maes [*Preprint*]

[P3] Constructing and Evaluating an Explainable Model for COVID-19 Diagnosis from Chest X-rays
R Khincha, S Krishnan, K Guru-Murthy, T Dash, L Vig, A Srinivasan [*Preprint*]

[P4] CovidDiagnosis: Deep Diagnosis of COVID-19 Patients using Chest X-rays
K Mahajan, M Sharma, L Vig, R Khincha, S Krishnan, et al.
*MIL3D, MICCAI 2020. Springer LNCS [Paper]*

[P5] A Case Study of Transfer of Lesion-Knowledge
S Krishnan, R Khincha, L Vig, T Dash, A Srinivasan
*TIA, MICCAI 2020. Springer LNCS [Paper | Talk]*

[P6] Robustness to Missing Features using Hierarchical Clustering with Split Neural Networks
R Khincha, U Sarawgi, W Zulfikar, P Maes
*AAAI 2021 (Student Abstract) [Paper | Poster]*

[P7] Network Community Analysis Based Enhancement of Online Discussion Forums
S Krishnan, R Khincha, N Goveas
*CODS-COMAD 2021 YRF - Honorable Mention [Paper | Talk]*

## Achievements

- Selected, **Google Research AI Summer School**, Aug 2020
- Winner, **Ingenuity Challenge**, Oct 2020
- Runner-up, **Goldman Sachs Intern Coding Challenge**, Jun 2020
- Bronze, **Shell Windmill Optimisation Challenge**, Sep 2020