# Madhumita Sushil

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My research interest is to use machine learning and natural language processing algorithms to improve healthcare. In the clinical domain, it is important to make predictions explainable. Consequently, I have been developing model-agnostic interpretability methods to better understand neural models and their output predictions.

## Education

Sep '16 – present **PhD in Computational Linguistics**
*University of Antwerp*, Belgium.
Supervisors: Prof. Dr. Walter Daelemans, Dr. Simon Šuster

Oct '13 – Feb '16 **Master of Science in Language Science and Technology**
*Saarland University*, Germany, *1.5/5 (1.0 highest, lower is better)*.
Thesis — Recognizing Textual Entailment
- Developed subword distance-based and embedded vectors-based lexical alignment algorithms to align text and hypothesis segments for textual entailment classification.

Supervisors: Prof. Dr. Günter Neumann, Prof. Dr. Dietrich Klakow

July '09 – May '13 **Bachelor of Technology in Computer Science and Engineering**
*VIT University*, Vellore, India, *8.98/10*.

## Work Experience

Dec '19 – Mar '20 **Research internship**
*Google Brain Applied team*, Zürich, Switzerland.
Host: André Susano Pinto
- Analyzed inductive bias in BERT representations towards linguistic reasoning skills.

Apr '16 – Dec '17 **Junior Research Developer**
*Antwerp University Hospital*, Antwerp, Belgium.
Natural Language Processing for clinical applications (Project *Accumulate* funded by VLAIO, Belgium).
- Developed techniques for unsupervised patient representation learning with gradient-based analysis for model interpretability.
- Developed classifiers for automated psychiatric symptom severity identification.

Dec '13 – Nov '15 **Research Assistant**
*German Research Center for Artificial Intelligence*, Saarbrücken, Germany.
- Designed and implemented a textual entailment engine for English (Project *Excitement* funded by the EU).
- Designed and developed the website: `http://www.qt21.eu`.

Jan '13 – May '13 **SDE Intern**
*TCorpus Analytics*, Technology Business Incubator, Vellore, India.
- Designed and implemented an analytics platform for financial text data.

## Publications

**Madhumita Sushil**, Simon Šuster, and Walter Daelemans. Rule induction for global explanation of trained models. In *Proceedings of the 2018 EMNLP Workshop BlackboxNLP: Analyzing and Interpreting Neural Networks for NLP*, pages 82–97. Association for Computational Linguistics, 2018.

Simon Šuster, **Madhumita Sushil**, and Walter Daelemans. Revisiting neural relation classification in clinical notes with external information. In *Proceedings of the Ninth International Workshop on Health Text Mining and Information Analysis*, pages 22–28. Association for Computational Linguistics, 2018.

**Madhumita Sushil**, Simon Šuster, Kim Luyckx, and Walter Daelemans. Patient representation learning and interpretable evaluation using clinical notes. *Journal of Biomedical Informatics*, 84:103 – 113, 2018.

**Madhumita Sushil**, Simon Šuster, Kim Luyckx, and Walter Daelemans. Unsupervised patient representations from clinical notes with interpretable classification decisions. *Workshop on Machine Learning for Health, NeurIPS, arXiv preprint arXiv:1711.05198*, 2017.

Elyne Scheurwegs, **Madhumita Sushil**, Stéphan Tulkens, Walter Daelemans, and Kim Luyckx. Counting trees in random forests: Predicting symptom severity in psychiatric intake reports. *Journal of Biomedical Informatics*, 75:S112 – S119, 2017. A Natural Language Processing Challenge for Clinical Records: Research Domains Criteria (RDoC) for Psychiatry.

Neha Tekriwal, **Madhumita Sushil**, and P. Venkata Krishna. Integration of safety and smartness using cloud services: An insight to future. In Khaled Elleithy and Tarek Sobh, editors, *Innovations and Advances in Computer, Information, Systems Sciences, and Engineering*, pages 293–303, New York, NY, 2013. Springer New York.

## Activities and Service

**Thesis committee** Assessment of MA thesis in Computational Linguistics by Jens Lemmens, '19.
Title: *Extracting Drug, Reason, and Duration Mentions from Clinical Text Data - a comparison of approaches.*

**Mentoring** Google Summer of Code '19 project on bias identification in machine learning models: `https://github.com/clips/gsoc2019_bias`.

**Program committee** Workshop on Machine Learning for Health at NeurIPS '17, '18, '19.
Widening NLP Workshop at ACL '19, '20.
Student Research Workshop at ACL '19.

**Invited talk** Blackbox@NL: Dutch workshop on interpretation of neural networks, Den Bosch, '19.
Title: *Synthetic dataset for explaining and evaluating rules learned by RNNs.*

**Invited poster** 3rd Google NLP Summit, Zürich '19.
Title: *Rule induction for global explanation of neural classifiers*.

**Student board** European Association of Computational Linguistics (EACL) '19 – '20.

**Virtual training** Google's invite-only *Get Ahead* virtual technical development program, May – Jun '19.

**Summer school** Lisbon Machine Learning school (LxMLS) '16.

**Volunteer** Mentor to an under-privileged girl in rural India through the initiative *e-shishya* (`http://e-shishya.com/`), Jul – Dec '18.
Interspeech '15.

**Organizer** Natural Language Processing reading group at CLiPS, University of Antwerp, '20.

**Vice President** Computer Society of India, VIT University, '11 – '12.

**Core committee** Computer Society of India, VIT University, '09 – '11.

## Awards and Recognition

**Research grant** Google Cloud Platform research credit grant (in kind, retail value $1,000), '20.

**Excellent reviewer** Machine Learning for Health workshop, NeurIPS '19 (among top 5% of the reviewers).

**Travel grant** Google intern travel scholarship for Grace Hopper Celebration '19.

**Fellowship** International Max Planck Research School for Computer Science (IMPRS-CS) PhD fellowship, Saarbrücken, '15. *Declined* in favour of clinical NLP research at the Antwerp University Hospital.

**Student achiever** VIT University, '12.

**Finalist** One of the top 22 teams across India in the *Intel India Embedded Challenge* '12 for the project *Smartphone for the visually impaired*.

**Winner** Hackathon, *Exebit* '12, IIT Madras.