BHAWNA PALIWAL

Research Engineer, Microsoft Research

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EDUCATION

Indian Institute of Technology (IIT), Ropar *2017 - 2021*
Bachelor of Engineering in Computer Science
Awarded with Director's Gold Medal
Grade (CGPA): 9.4/10

EXPERIENCE

Microsoft Research Sep 2021 - Present
Research Engineer *Bangalore*

- *Advisor: Manik Varma*
- Focused on developing deep learning algorithms for large-scale systems in the realms of search and recommendation impacting millions of users within Microsoft's ecosystem.
- My research is centered around enhancing text generation and recommendation systems through the utilization and development of efficient transformer and Extreme Classification based architectures for primary use cases in Bing Search pipeline.

Monash University Aug 2020 - Jan 2021
Research Intern *Remote*

- *Advisor: Abhinav Dhall*
- Developed an explainable architecture for diagnosis report generation for medical images.
- Proposed and implemented a multi-modal deepfake-detection algorithm, which utilized physiological signals from counterfeit videos.

Microsoft May 2020 - July 2020
Software Engineering Intern *Remote*

- Developed a task aware chatbot and channel for android applications, leveraging efficient intent classification models for seamless user interaction

Indian Institute of Science (IISc) May 2019 - July 2019
Research Intern *Bangalore*

- *Advisor: Vijay Natarajan*
- Worked on matrix visualization tools for visualizing large-scale topological data structures.

RESEARCH PAPERS

CROSS-JEM: Cross-encoder Joint Efficient Modeling for ranking in sponsored search
Bhawna Paliwal*, Deepak Saini*, Mudit Dhawan*, Jian Jiao, Manik Varma
Under Review at The Web Conference (WWW), 2024

Improved Retrieval of Novel Keywords for Sponsored Search
Sachin Yadav*, Deepak Saini*, Anirudh Buvanesh, **Bhawna Paliwal**, Kunal Dahiya, Jian Jiao, Manik Varma
Under Review

Enhancing Tail Performance in Extreme Classifiers by Label Variance Reduction
Anirudh Buvanesh et al. including **Bhawna Paliwal**
Under Review at International Conference on Learning Representations (ICLR'24)

NGAME: Negative Mining-aware Mini-batching for Extreme Classification
Kunal Dahiya et al. including **Bhawna Paliwal**
Proceedings of the Sixteenth ACM International Conference on Web Search and Data Mining, WSDM '23 [PDF]

This explains That: Congruent Image–Report Generation for Explainable Medical Image Analysis with Cyclic Generative Adversarial Networks
Bhawna Paliwal*, Abhineet Pandey*, Abhinav Dhall, Ramanathan Subramanian, Dwarikanath Mahapatra
4th International Workshop iMIMIC, MICCAI 2021 [PDF]

Visual Representations of Physiological Signals for Fake Video Detection
Kalin Stefanov, **Bhawna Paliwal**, Abhinav Dhall
arXiv preprint [PDF]

SELECTED RESEARCH PROJECTS

Real-Time Query AutoCompletion using Extreme Classification 2021-22
Advisors: Yashoteja Prabhu, Manish Gupta, Manik Varma

- Query AutoCompletion is a real-time service that quickly provides query completions for millions of users on large search engines. Large autoregressive language models, which generate completions token by token, are computationally expensive and are not suitable for production deployment.
- Led and implemented a new approach where we reformulate Query AutoCompletion as a **classification task with a large label set** consisting of all possible completions of a query. Different from traditional autoregressive methods, we can now obtain a set of completions for a query in a single shot.
- Our solution can provide 5× more accurate suggestions than autoregressive language models of similar parameter count while having 2× lower latency on CPUs, and was found to reduce user typing effort by 7% during A/B tests on Bing.

Efficient Ranking for Large-scale Recommendation Systems 2023
Advisor: Manik Varma

- In the landscape of large-scale recommendation systems, the process is bifurcated into two crucial stages: retrieval and ranking. In the retrieval stage, the challenge lies in narrowing down millions of items to mere thousands, while the ranking stage entails re-ordering these shortlisted items based on scores generated by a computationally intensive transformer-based cross-encoder.
- The conventional approach using transformer-based cross-encoders processes query-item pairs individually, rendering it unfeasible when dealing with thousands of items per query.
- Implemented a joint architecture that scores multiple items per query in a single encoder pass, efficiently leveraging redundancies in sequence modeling and token overlaps. By adopting this approach, our model achieves over a 10× speed improvement compared to vanilla cross-encoders while maintaining minimal accuracy loss. This work is currently under review for WWW'24.

Explainable Medical Report Generation 2021
Advisors: Abhinav Dhall, Ramanathan Subramanian, Dwarikanath Mahapatra

- Addressed the limitation of deep learning-based black-box models in medical diagnosis by providing trustworthy and faithful explanations alongside model predictions.
- Recognized the common reliance on post-hoc modules for explanation generation, which often results in explanations inconsistent with model decisions.
- Proposed and implemented a cycle-GAN based architecture to produce coherent image-report pairs for chest X-Ray image diagnosis, ensuring that the generated report effectively clarifies the image, and vice versa. This research was published at iMIMIC, MICCAI, 2021.

Physiological Signals for Improving Deepfake Detection 2022

Advisor: Abhinav Dhall

- The proliferation of realistic fake videos created by deep learning models poses a significant risk for the dissemination of harmful misinformation.
- In contrast to traditional methods that rely on audio and visual artifacts for video classification, our research demonstrates the substantial improvement in deepfake detection accuracy by incorporating physiological signals in addition to audio and visual modalities.
- Devised architectural solutions for seamlessly integrating generated physiological signals into state-of-the-art multi-modal deepfake detection systems. This work is out on arxiv.

HONOURS AND AWARDS

Recipient of Director's Gold Medal for best all round performance during undergrad in academics, sports, and leadership *2021*

Global Rank 2 in CVPR 2021 workshop challenge on eye gaze detection *2021*

Awarded with Merit scholarship during all 8 semesters at IIT Ropar *2017-2021*

Winner of Smart India Hackathon organized by MHRD, Govt. of India *2020*

PROFESSIONAL OUTREACH

Presented our work on **Real-Time Query AutoCompletion using Extreme Classification** to Microsoft Research India's annual meeting (2023)

Volunteer: WiCV (CVPR'21), Microsoft Booth@NeurIPS'22, COLT'23