Amogh **Hiremath**

Senior AI Scientist

Pittsburgh, Pennsylvania

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About Myself

Four years of industry experience as a research scientist in healthcare AI. Currently leading the development of advanced AI based imaging biomarkers for oncology at an early-stage startup. Specialized in AI tools for disease diagnosis, treatment selection, and prognosis. Skilled in hand-crafted feature engineering (radiomics), machine learning and deep learning model optimization, automated and semi-automated deep learning based image segmentation and detection. Committed to advancing healthcare through pioneering advancements in medical imaging.

Education

Case Western Reserve University *Cleveland, Ohio, US*

Ph.D. in Biomedical Engineering *Aug. 2018 - Aug. 2022*

- Research primarily focused on applications of deep learning and machine learning (radiomics) on medical images for diagnosis and prognosis of various diseases.

National Institute of Technology, Karnataka *Surathkal, Karnataka, India*

M.Tech in Communication Engineering *Jun. 2014 - May 2016*

- CGPA: 8.31/10.
- Coursework primarily focused on advanced signal and image processing.

SDMCET, Dharwad *Dharwad, Karnataka, India*

B.E in Electronics and Communication Engineering *Jul. 2010 - Jun. 2014*

- CGPA: 9.23/10
- Coursework primarily focused on fundamentals of signal and image processing, engineering mathematics and telecommunication.

Experience

Picture Health *Pittsburgh, Pennsylvania, US*

Senior AI Scientist *May. 2022 - Present*

- One of the earliest employees of the company (4th full time employee).
- Responsible for building core AI tools and frameworks, with publications in top-tier conferences (multiple first-authored abstracts from 2023 to present) and two patented inventions.
- Lead scientist overseeing a project for a pharmaceutical client, involved in the development of imaging biomarkers to facilitate patient selection for a clinical trial.
- Managing junior scientists and part time candidates.

Philips Reasearch, India *Bangalore, Karnataka, India*

Senior Research Engineer *Jun. 2016 - Jul. 2018*

- Data engineering (ETL (Extract, Transfer, Load)) of massive ICU databases
- Early prediction of different Hospital Acquired Infections acquired by patients in the ICUs

Philips Research, India *Bangalore, Karnataka, India*

Project Trainee (Intern) *May. 2015 - Jun. 2016*

- Building quick prototypes in applications of healthcare using concepts of machine learning, image processing, and natural language processing.
- Software development: GUI based annotation tools for Chest X-rays

Indian Institute of Technology, (IIT) Kharagpur *Kolkata, West Bengal, India*

Deep Learning for Visual Computing (DLVC) Summer School, 2017 *Jul. 2017*

- A summer school conducted by IIT Kharagpur, India covering different deep learning techniques applied on images with an overview of convolutional neural networks.
- Earned 1st Place in DLVC 2017 Challenge (Bengali Language Digit Recognition).

Carnegie Mellon University - National Institue of Technology, Karantaka *Surathkal, Karnataka, India*

NITK - CMU Winter School, 2014 *Dec. 2014*

- Developing a machine learning model to classify environmental sounds - “An Approach Towards Never Ending Learning of Sound”.

Skills

Programming Language (Experience): Python (>8 years), JAVA (1 year), LaTeX (5 years)

Tools Matlab, R, ITK Snap, Slicer 3D

Libraries pytorch, hydra, numpy, matplotlib, pandas, scikit-learn, scikit-image, scikit-survival, scipy, pyspark, ITK (C++), simpleITK (Python), openCV (python).

Patents

- **Hiremath, A**, Braman, N; Picture Health Inc., assignee, **"Methods and Systems for Medical Prediction Using Negative Predictive Value"**, 2023, November (Provision patent filed).
- Braman, N, **Hiremath, A**, Li, H; Picture Health Inc., assignee, **"System for Medical Prediction with Click-Based Segmentation"**, 2023, February (Provision patent filed).
- Madabhushi, A, Asaeikheybari, G, **Hiremath, A**, Chung, M.K, Barnard, K; Cleveland Clinic Foundation Case Western Reserve University, assignee, **"Atlas construction of branched structure for identification of shape differences among different cohorts"**, WIPO (PCT), US20230146428A1, 2022, November (Pending).
- Ulman, S, Prasad, RV, **Hiremath, A**; Koninklijke Philips N.V, assignee, **"Nutrition support systems and methods"**, WIPO (PCT), WO2019063762A1, 2019, April.

Journal Publications

- Li L, Shiradkar R, Gottlieb N, Buzzy C, **Hiremath A**, Viswanathan VS, MacLennan GT, Lima DO, Gupta K, Shen DL, Tirumani SH. **Multi-scale statistical deformation based co-registration of prostate MRI and post-surgical whole mount histopathology**. Medical Physics, Sep 24, 2023.
- Midya, A, **Hiremath, A**, Huber, J, Viswanathan VS, Omil-Lima, D, Mahran, A, Bittencourt, L, Tirumani, SH, Ponsky, L, Shiradkar, R, Madabhushi, A, 2023, **Delta radiomic patterns on serial bi-parametric MRI are associated with pathologic upgrading in prostate cancer patients on active surveillance: preliminary findings**, Frontiers in Oncology, 13, p.1166047.
- Vaidya, P, Alilou, M, **Hiremath, A**, Gupta, A, Bera, K, Furin, J, Armitage, K, Gilkeson, R, Yuan, L, Fu, P, Lu, C, Ji, M, Madabhushi, A, 2022. **An End-to-End Integrated Clinical and CT-Based Radiomics Nomogram for Predicting Disease Severity and Need for Ventilator Support in COVID-19 Patients: A Large Multisite Retrospective Study**, Frontiers in Radiology 2, Jan 2022.
- **Hiremath, A**, Bera, K, Yuan, L, Vaidya, P, Alilou, M, Furin, J, Armitage, K, Gilkeson, R, Ji, M, Fu P, Gupta, A, Lu, C, and Madabhushi, A, 2021. **Integrated Clinical and CT based Artificial Intelligence nomogram for predicting severity and need for ventilator support in COVID-19 patients: A multi-site study**, IEEE Journal of Biomedical and Health Informatics, Aug, 2021.
- **Hiremath, A**, Shiradkar, R, Fu, P, Mahran, A, Rastinehad, A.R, Tewari, A, Tirumani, S.H, Purysko, A, Ponsky, L. and Madabhushi, A, 2021. **An integrated nomogram combining deep learning, Prostate Imaging–Reporting and Data System (PI-RADS) scoring, and clinical variables for identification of clinically significant prostate cancer on biparametric MRI: a retrospective multicentre study.** The Lancet Digital Health, 3(7), pp.e445-e454.
- **Hiremath, A**, Shiradkar, R, Merisaari, H, Prasanna, P, Ettala, O, Taimen, P, Aronen, H.J, Boström, P.J, Jambor, I. and Madabhushi, A, 2021. **Test-retest repeatability of a deep learning architecture in detecting and segmenting clinically significant prostate cancer on apparent diffusion coefficient (ADC) maps.** European radiology, 31(1), pp.379-391.
- Mahadevaiah, G, **Hiremath, A**, Agarwal, V, Kumaraguru, P, and Dekker, A **"Automating data mining of medical reports"**, International Journal of Computer Science and Technology (IJCST) Vol.01, No.2, March 2019.

Conference Publications

- Roge, A, **Hiremath, A**, Sobota, M, Tirumani SH, Bittencourt LK, Ream J, Ward R, Olaniyan H, Verma S, Purysko A, Madabhushi A, Shiradkar R, 2022, March. **Evaluating the sensitivity of deep learning to human reader based lesion delineations in identifying clinically significant prostate cancer on MRI**, In Medical Imaging 2022: Computer-Aided Diagnosis. International Society for Optics and Photonics.
- **Hiremath, A**, Yuan, L, Shiradkar, R, Bera, K, Viswanathan V.S, Vaidya, P, Furin, J, Armitage, K, Gilkeson, R, Ji, M, Fu P, Gupta, A, Lu, C, and Madabhushi, A, 2021. **LuMiRa: An Integrated Lung Deformation Atlas and 3D-CNN model of Infiltrates for COVID-19 Prognosis.**. The Medical Image Computing and Computer Assisted Intervention (MICCAI) (Accepted).
- **Hiremath, A**, Shiradkar, R, Braman, N, Prasanna, P, Rastinehad, A, Purysko, A. and Madabhushi, A, 2020, March. **A combination of intra-and peri-tumoral deep features from prostate bi-parametric MRI can distinguish clinically significant and insignificant prostate cancer.** In Medical Imaging 2020: Computer-Aided Diagnosis (Vol. 11314, p. 113140M). International Society for Optics and Photonics.

Peer-reviewed Abstracts/Posters

- **Hiremath, A**, Lee, S, Lee J, and others, **"CheckpointPx, an interpretable radiology AI tool, predicts checkpoint blockade benefit independent of PDL1 status in non-small cell lung cancers (NSCLC) A multi-institutional validation study"**, American Association for Cancer Research (**AACR**), San Diego, CA, April 5-10, 2024.
- Lee, S, **Hiremath, A**, Lee J, and others, **"AI-powered radiomics model predicts immune checkpoint inhibitor-related pneumonitis (CIP) in advanced NSCLC patients"**, American Association for Cancer Research (**AACR**), San Diego, CA, April 5-10, 2024.

- Lee, S, Zhang, K, Lee J, Kim PK, **Hiremath, A** and others, **"Accelerated and precise tumor segmentation in NSCLC: A comparative analysis of automated ClickSeg and manual annotation for radiomics"**, American Association for Cancer Research (**AACR**), San Diego, CA, April 5-10, 2024.
- Midya, A, Balakrishnan, S, Tirumani SH, Bittencourt LK, **Hiremath, A**, Ponsky, L, Madabhushi, A, Shiradkar, R, **"Population specific radiomics model improves prostate cancer diagnostic risk stratification at MRI in African American men"**, American Urological Association (**AUA**), San Antonio, TX, May 3 – May 6, 2024.
- Midya, A, Asaeikheybari, G, **Hiremath A**, Viswanathan VS, Sun, H, Harwood, S, Kim HS, Schilling, T, Telfer, W, Jin A, Baraboo J, Pradella, M, Markl, M, Passman, R, El-harasis, M, Shoemaker, MB, Tandon A, Barnard, J, Chung, MK, Madabhushi, A, **"Machine learning with Multimodal Pre-Ablation Imaging for predicting recurrence in Atrial Fibrillation patients"**, American Heart Association (**AHA**), November 11–13, 2023.
- **Hiremath, A**, Bera, K, Gupta, A, Velcheti, V, Madabhushi, A, and Braman, N, **"Radiomic signature of identifies outcome and prognosis to immune checkpoint inhibitors (ICI) in PD-L1 low non-small cell lung cancer (NSCLC)"**, 2023 World Conference on Lung Cancer (**WCLC**), Singapore, September 9-12, 2023.
- **Hiremath, A**, Li, H, Clement, A, Gupta, A, Velcheti, V, Madabhushi, A, and Braman, N, **"Single-click radiomic classifier is associated with response and prognosis in non-small cell lung cancers (NSCLC) treated with immune checkpoint inhibitors"**, American Society of Clinical Oncology (**ASCO**), Chicago, June 2-6th, 2023.
- Sompalle, P., Roge, A., Sobota, M., **Hiremath, A.**, Tirumani, S.H., Kayat Bittencourt, L., Purysko, A., Viswanath, S., Madabhushi, A., and Shiradkar, R., **"Association of MR image quality measures with diagnostic accuracy and inter-reader agreement of PI-RADS for detection of prostate cancer"**, 32nd Annual Meeting of the International Society for Magnetic Resonance in Medicine (**ISMRM**), Toronto, June 3-8, 2023.
- Asaeikheybari, G., **Hiremath, A.**, Shiradkar, R., El-Harasis, M., Shoemaker, B., Barnard, J., Gupta, A., Chung, M., Madabhushi., Anant, **"Computationally identified shape differences in the Left Atrium on pre-ablation CT scans appear to be associated with recurrence of atrial fibrillation"**, American Heart Association (**AHA**), Boston, Nov 13-15th, 2021.
- Shiradkar R, Sobota M, Bittencourt LK, Tirumani SH, Ream J, Ward R, **Hiremath, A**, Roge A, Mahran A, Purysko A, Ponsky L, Madabhushi , **"Sensitivity of radiomics to inter-reader variations in prostate cancer delineation on MRI should be considered to improve generalizability"**, 29th Annual Meeting of the International Society for Magnetic Resonance in Medicine (**ISMRM**), May 15-20, 2021.
- **Hiremath, A**, Shiradkar, R, Merisaari, H, Prasanna, P, Ettala, O, Taimen, P, Aronen, H, Boström, P, Pierce, J, Tirumani, S, Rastinehad, A, Jambor, I, Purysko, A, and Madabhushi, A, **"A deep learning network along with PIRADS can distinguish clinically significant and insignificant prostate cancer on bi-parametric MRI: A multi-center study"**, American Urological Association (**AUA**), Washington DC, May 15-16th, 2020.
- **Hiremath, A**, Shiradkar, R, Merisaari, H, Prasanna, P, Ettala, O, Taimen, P, Aronen, H, Boström, P, A, Jambor, I, and Madabhushi, A, **"Test-retest repeatability of convolutional neural networks in detecting prostate cancer regions on diffusion weighted imaging in 112 patients"**, 28th Annual Meeting of the 28th Annual Meeting of the International Society for Magnetic Resonance in Medicine (**ISMRM**), Sydney, Australia, April 18-23, 2020.
- Merisaari, H, Shiradkar, R, Toivonen, J, **Hiremath, A**, Khorrami, M, Montoya Perez, I, Pahikkala, T, Taimen, P, Verho, J, Boström, P, Aronen H, Madabhushi, A, and Jambor, I, **"Repeatability of radiomics features for prostate cancer diffusion weighted imaging obtained using b-values up to 2000 s/mm2"**, 27th Annual Meeting of the 28th Annual Meeting of the International Society for Magnetic Resonance in Medicine (**ISMRM**), Montreal, Canada, May 11-16, 2019.
- Merisaari, H, **Hiremath, A**, Shiradkar, R, Montoya Perez, I, Toivonen, J, Taimen, P et al., **"Repeatability of Machine Learning Classification of Prostate Cancer Using Diffusion Weighted Imaging: Short-term Repeatability Study of 112 Men Who Underwent Two Prostate MR Examinations Before Prostatectomy"**, Annual Meeting of the Radiologic Society of North America (**RSNA**), Chicago, U.S.A, November 29 - December 4, 2019.

Honors & Awards

2021	**MICCAI Student Travel Award**, The Medical Image Computing and Computer Assisted Intervention	*Strasbourg, France*
2021	**Excellence in Graduate Teaching**, Case Western Reserve University	*Cleveland, U.S.A*
2020	**I-Corps, Ohio Grant Funding**, Case Western Reserve University	*Cleveland, U.S.A*
2020	**Runner up, Trainee competition**, ISMRM MR of cancer study group	*Sydney, Australia*
2020	**Educational Stipend**, International Society for Magnetic Resonance in Medicine (ISMRM)	*Sydney, Australia*
2020	**Professional Development Travel Funding**, Case Western Reserve University	*Cleveland, U.S.A*
2020	**Trainee Travel Award**, Case Comprehensive Cancer Center	*Cleveland, U.S.A*
2020	**Runner up**, Art of STEM Competition, Case Western Reserve University	*Cleveland, U.S.A*
2018	**1st Place**, Cleveland Medical Hackathon, 2018	*Cleveland, U.S.A*
2017	**1st Place**, Deep Learning for Visual Computing Challenge, 2017	*Kolkata, India*

Recognition

- **Bioethics in the Age of COVID-19: Laundering bias and saving lives through**
- **Indian-Origin Engineer Builds AI To Predict If A Covid Patient Will Need Ventilator**
- **Case Western Reserve University lab using digital images of chest scans from coronavirus patients from Wuhan, China, to teach its computers to triage patients**
- **Test-Retest Repeatability of a Deep Learning Architecture in Detecting and Segmenting Clinically Significant Prostate Cancer on Apparent Diffusion Coefficient (ADC) Maps - Beyond the Abstract- Featured in UroToday**
- **BME Graduate Students Win Top Prizes at the Cleveland Medical Hackathon Event**
- **44 students prepare 10 projects at Winter School**