# Venkatesh Vijaykumar

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## Education

MS Computer Science Georgia Institute of Technology (Georgia Tech)

Specialization in Interactive Intelligence.

Coursework: Machine Learning, Reinforcement Learning, Knowledge Based AI, Machine Learning for Trading, AI for Robotics, Human-Computer Interaction, Data Visualization and Analytics.

BTech	Biomedical	Engineering
DV D		

DY Patil University

(2011 to 2015) Mumbai, MH

(2017 to 2019)

Atlanta, GA

Thesis: Non-Invasive Glucometer

Coursework: Digital Signal Processing, Digital Image Processing, Medical Imaging 1&2, Microprocessors and Microcontrollers 1&2, Electronic Circuit Design, Biomedical Instrumentation 1&2, Digital Logic Design.

#### Experience

Project Research Assistant (Algorithm Design) Indian Institute of Technology- Bombay (IIT-B) (01-2015 to 10-2017) Mumbai, MH

- Led software and algorithm development for smart healthcare devices.
- Developed custom computer vision algorithms and filters for segmentation tasks in hyperspectral imaging.
- Worked with de-noising, and morphological transforms for data cleaning and processing.
- Developed real time video processing versions for these algorithms, for deployment on single board platforms.
- Developed relational model for biological parameters for obtaining continuous valued outputs.
- Collected and maintained bio-electric signal datasets, and performed data processing and cleaning processes on this.
- Worked with Machine Learning based predictive techniques, such as Artificial Neural Network regressors in order to perfect variable relationships.
- Developed a custom peak detection algorithm for raw bio-electric signals based on the Z-score parameter.
- Worked on the data processing and cleaning extensively for these signals.
- Developed custom hardware for these devices.

### Skills

Machine Learning, Computer Vision, Deep Learning, Reinforcement Learning, Natural Language Processing, Analytics, Statistical Modeling, Mathematical Modeling, Research and Development, Scientific Writing, Signal Processing, Embedded Electronics

### Tools

Programming: Python, Java, JavaScript [d3.js], C++, MATLAB
Machine Learning: Scikit-learn, TensorFlow, Keras, Theano, Google Colaboratory, Jython, ABAGAIL
Computer Vision: OpenCV, PIL
Core Python Modules: Numpy, Scipy, Pandas
Data Visualization: Tableau, Matplotlib, Gephi, Seaborn
Data Science: Hadoop [Java], Hive, Pig, Spark [Scala and Python], SQL
Android Development: Android, JUnit, Espresso
Cloud Services: AWS [EMR, S3], Microsoft Azure

## **Featured Projects**

**Facebook AI Research, Hateful Memes Contest:** Development of a classification system, for flagging offensive meme content posted on social media. This involved the development of a multi-input, multi-modal classifier for text and image data. It involves the development of convolutional neural networks, LSTMs, and transformer based models such as VisualBERT, and exploration of embedding techniques for text data. It also involved developing functional API based CNN models for image data.

**Deep Learning for Computer Vision:** A collection of implementations of seminal CNN architectures such as AlexNet, and GoogLeNet in the form of a Python package. The package also contains processing pipelines for the incoming image data. The network architectures were benchmarked against significant datasets such as CIFAR-10 and Dogs vs Cats.

**OpenCV, Ridge Detection Filter:** Ridge detection based on the principal eigenvalue of the Hessian matrix and morphological transforms. The work segments long thin regions of high/low intensity in an image using the second-derivative matrix of that image. The final version of this filter has been contributed to the OpenCV library, and resides within its Contrib module.

**Non-Invasive Glucometer:** The device is an in vivo infrared spectrometer to measure blood glucose. It is utilizes a reflectance based sensor on a fingertip for making measurements. An India patent is pending.

**CNN for Diabetic Retinopathy:** A basic convolutional neural network applied to the Medissor diabetic retinopathy image database from Kaggle. The convolutional neural network was designed to work with low data resources. Data augmentation techniques were utilized.

**Play Music:** An HCI Oriented Evaluation of Google's Default Music Player Interface. This work is an observer critique of the Play Music Android application, as regards the task of creating playlists and queues in specific, and the entire interface in general.

### **Published and Peer-Reviewed Work**

**Mineseeker:** A game environment for image segmentation inspired by MineSweeper published in the International Journal of Advance and Innovative Research. The work proposes a novel environment for training image segmentation models via gamification. The image itself becomes the environment, and the task would be to tag pixels of interest, much like the original MineSweeper game.

Publication URL: http://iaraedu.com/pdf/ijair-volume-6-issue-1-xxviii-january-march-2019.pdf

**Bacteria Species Classification:** A published study in the October 2016 edition of the International Journal of Computer Applications about classifying species of bacteria from their images. The work explored the use of image key point vectors as feature inputs for a neural network classifier. The work also utilized an early iteration of patch processing for data augmentation.

Publication URL: http://www.ijcaonline.org/archives/volume151/number8/26254-2016911851

**YouTube Trending Video Analysis:** A peer reviewed poster in the Fall 2019 class of CSE-6242 Data and Visual Analytics at Georgia Tech that attempts to interpret factors contributing to virality of a video on the YouTube platform. The various factors analysed were the length of the title and description, the number of likes, dislikes, and comments. We created cluster matrices, word clouds and other visualization dashboards for representing the data. We used a neural network regressor in order to predict the possible number of views based on these aforementioned parameters.