

# Monica R. Tirupari

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## PROFILE

- Master's Graduate from New York University's Tandon School of Engineering. Strong emphasis and application of **Machine Learning, Data Center & Cloud Computing**, Programming for **Big Data Analytics, Deep Learning, Internet Architecture and Protocols, Network Security**
- **Cisco Certified Network Associate** – ID No. CSC013043373 (961/1000)
- **Amazon Web Services Certified Solutions Architect Associate** (Expected March 2018)

## EDUCATION

**New York University**, New York City, NY (GPA 3.34/4) Aug 2016 – May 2018  
Master of Science, Computer Engineering

**Visvesvaraya National Institute of Technology**, Nagpur, India (GPA 7.01/10) Aug 2012 - May 2016  
Bachelor of Electronics and Communications Engineering

## SKILLS

**Programming Languages:** C, Python, Java, R, Scala

**Software Tools:** Hadoop, MapReduce, Pig, Hive, Apache Spark, SQL, NoSQL, Sqoop, Microsoft Word, PowerPoint, Excel, Adobe Photoshop, MATLAB, Xilinx, GNS, Tableau, NGSPICE, VHDL, MySQL, Wireshark, Metasploit, Nessus

**AWS Services:** S3, EC2, EBS, Route 53, IAM, VPC, RDS, Redshift, Lambda, DynamoDB

**Operating Systems:** Linux, Windows, Mac OSX

## WORK EXPERIENCE

**Graduate Analyst | Admin Department | New York University** Jan 2017 – Present

- Worked on scalable distributed data system using Hadoop ecosystem.
- Developed Simple to complex Map/reduce jobs using java, Hive and Pig.
- Transformed the imported data using Hive and MapReduce.
- Used Sqoop to import the data from RDBMS to Hadoop Distributed File System (HDFS) and later analyzed the imported data using Scala, and PySpark.
- Wrote Hive queries and Pig scripts to study students interests and behavior in choosing courses by analyzing the data.

**Alternative Cloud Assistant | Moses Center | New York University** Nov 2016 – Dec 2016

- Experience on AWS cloud services like EC2, S3, RDS, ELB, and EBS for installing, configuring and troubleshooting on various Amazon images for server migration from physical into cloud.
- Helped in converting documents into braille using Visual Studio, Adobe Illustrator, Adobe Acrobat, Omni Page and Capture Perfect, Data entry and data cleaning in clock work and excel.

## PROJECTS / CERTIFICATIONS/ LABS

### Adversarial Machine Learning: The Attacks and the Defenses

- MNIST dataset with 70,000 handwritten samples is used to learn the adversarial examples using training and testing samples.
- Built a neural network using a Theano library for Red team (attackers) and Blue team (Defenders).
- We have used ReLU activation function and RMSprop for adaptive learning and plotted the accuracy and confidence.
- Then we have performed the L1 and L2 regularizations on the adversarial images and improved accuracy and confidence.
- We have created this learning model using Python modules like theano, numpy, pickle and plotted graphs using matplotlib.

### Music Classification using a Neural Network

- Loaded the music data files from University of Iowa, harmonics of audio notes with respect to fundamental frequency is achieved using melspectrogram and specshow of librosa package.
- Built a Neural network classifier using sigmoid activation and printed the model summary. Saved the loss and validation accuracy defined using a callback class.
- Created an optimizer and compiled the model using compile method. Fitted the model for few epochs and passed the test data using the callback class.
- I have achieved validation accuracy which is above 99%, plotted the loss values using semilogy plot.
- Optimized entire program using three different learning rates with plotting the loss functions and found lower learning rates are more stable hence converge slower.

### Neural Data Model Order Selection for CRCNS DREAM dataset

- I have used DREAM dataset of Neuroscience website CRCNS. Used loadmat function from scipy.
- Using Heuristic model selection, I have formulated models of different complexities and linear fitted on all the neurons using fit and predict functions in regression.
- Sorted top 100 neurons having highest R-Squared values using argsort function and discarded neurons which have lower correlations.
- Used K-fold cross validation to find Optimal order of Neurons visualizing through errorbar plots.

### **Extended MNIST letter detection using SVM**

- I have added non-digit letter images to MNIST digit data, remapped then between -1 to 1 and plotted using imshow method.
- Performed exception and error handling in python, included the non-digits using skimage package.
- Defined and tested the MNIST reshape program using python and plotted the resized images using subplot function.
- Dumped the resultant captured images using dump method in pickle and created extended training data using vstack command in numpy.
- Created and ran a SVM classifier and fitted training samples randomly using fit command in SVM, therefore achieving above 96% accuracy.
- I have normalized the confusion matrix and did some error plots.

### **Breast Cancer Diagnosis through Logistic Regression**

- Loaded Wisconsin breast cancer database using pandas read\_csv function. Cleaned the data using dropna method.
- Coded up the classifier function and measured the Precision, Recall, F1-Measure and then accuracy of the classifier.
- Fitted the data using logistic module through sklearn package.
- Used n-fold cross validation and measured the accuracy on training data and testing data.
- Implemented ROC curve for the classified data using sklearn module.

### **Gradient Descent Optimization**

- Computed Gradient descent and Loss functions using class methods and Lambda functions. Tested the gradient descent by measuring the actual and predicted functional difference.
- Built a simple gradient descent optimizer function with a fixed learning rate and with random initial condition. Measured the accuracy of final estimate.
- Used different learning rates for better convergence and accuracy. Plotted number of iterations and true function for different learning rates.
- Made a new Gradient optimizer using adaptive step size with the help of Armoji rule and got results with more better accuracy.

### **Trend Analysis of USSEC Stock data**

- Trade to Order Volume ratio of each exchange over millions of trades and trade volume are analyzed for each quarter of a year using Apache Spark, Python, R and Tableau.
- Predicted the next trade volume for top 6 companies with different exchanges using ARIMA time series model for five-year data and predicted the future data using R.
- Made an interactive dashboard with Python Plotly and Tableau enabling user interface with selective widgets and options.

### **Analyzing Yelp Data Set Challenge**

- Analyzed Yelp data set (in JSON format) using PIG Latin running on Hadoop and summarized the number of reviews of all the businesses in the data by each business category.
- Ranked all cities by businesses in the ascending order for each category of the data.
- Found rank summaries and average ratings for businesses running in a location range within USA.
- Completed the same assignment in Apache Spark and reviewed the difference in approaches.
- Provided statistical analysis and visualizations (distributions, graphs, maps) of the results in Tableau and Excel.

### **Java usage and exploration**

- Separated modifying method using string objects and explored StringBuffer class behavior when passed to a method
- Created a hierarchy for an example of product types using inheritance. Used "super" to chain constructors in the class hierarchy
- Updated the order types using polymorphism with the good type hierarchy with some product examples
- Worked on override methods from java language objects. Explored on the cast operation.
- Created interface that generically describes a service. Used Static imports to simplify code
- Implemented lambda expression for a functional interface
- Created and initialized an array list. Learned how to retrieve elements from a collection and iterated through it using an iterator
- Used generics for the collection instances. Sorted and Searched the catalog of goods.
- Created an exception class and used it to create an exception object. Used Try-Catch blocks to capture and react to problems

### **Cisco Certified Network Associate – ID No. CSC013043373 (961/1000)**

**Aug 2016 – Aug 2019**

- Configured Routing protocols (OSPF, BGP, VLANs, STP, HSRP) using command prompt and Linux platform, performed virtual simulation using GNS & Packet Tracer
- Learned multiple Switching functionalities
- Configured, verified and troubleshot IPv4 and IPv6 addressing of various network devices.
- Securing the network using ACL, Ex-ACL, DCL
- Experience working with real time Routers and Switches.

### **Flow Table Management and SDN Controller Programming**

- Created a network topology using Mininet and configured the controller to perform intelligent packet routing.
- Programed the RYU controller for flow table management, table size being the limiting factor.

### **Network Configuration and Ethical Exploration**

- Setup networks using cisco routers and worked on TCP, UDP, FTP, RIP, HTTP, DNS, DHCP, SSH, SNMP, NFS and other widely used protocols.
- Performed the SSL Strip MITM and DHCP Starvation attack. Exploited the victim to get shell access and transfer files.

### **Establish customized Network Topology using Mininet**

- Created python scripts to establish network topologies and customize the parameters such as Host IP and MAC addresses, link latency, link bandwidth and link packet loss rate
- Generated TCP flow between hosts using iperf and measured the bandwidth.

### **Network Packet tracing & vulnerability scanning**

- Vulnerability scan using Nessus gives the severity of the open ports
- Exploitation of a host through the open port using Metasploit.

### **SOCIAL ACTIVITIES (Visvesvaraya National Institute of Technology, Nagpur, India)**

**Founding Member of 'Prayaas'**. Administrator and Event Manager of a non-profit club founded in my college.

**2012 - 2016**