

SKILL SET

*Deep Learning, Information Extraction from Image Documents, Computer Vision, Image Processing, NLP, Python, Keras, Tensorflow*

PRESENT EMPLOYMENT & ACHIEVEMENTS

**Lead- Deep Learning Specialist**

(Aug'20 – Present)

**ROLE: Leading 9 DL Projects.**

**Key Projects:**

1. **Trade Automation:**

**Synopsis:** Swift messages play a key role in letters of credit in international trade such as cash in advance payment, documentary collections, open accounts and bank payment obligations. Collaborating with RPA to automate the maker process.

**Roles and Responsibilities:** Squad Lead, Solution architect and deep learning programmer.

**Summary:** Read the free flow text in swift messages, extract and populate the required fields using custom NER model and feature engineering.

2. **Skynet:**

**Synopsis:** Detect the primary and secondary types of risk associated in a text extracted from minutes of meeting, identify the accountable senior manager and produce them their responsible steps to overcome the risk.

**Roles and Responsibilities:** Squad Lead, Solution architect and deep learning programmer.

**Summary:** Extract the paragraphs from the RC decks, perform Multi label Text classification using stacked model combining SS3 algorithm and USE embedding with sequential nets.

3. **MT599 Information Extraction and message routing for 3 different county data:**

**Synopsis:** Understand the context of MT599 messages, route to the appropriate team based on the context and extract the relevant information based on the team's requirement.

**Roles and Responsibilities:** Squad Lead, Solution architect and deep learning programmer.

**Summary:** Classification model using SVC and Logistic regression is built for 5 imbalanced classes.

4. **ISO Rejection message Prediction:**

**Synopsis:** Built a classification model for mapping of ISO standard reject reasons for error messages.

**Roles and Responsibilities:** Squad Lead, Solution architect and deep learning programmer.

**Summary:** Classification model using Logistic regression is built. The project is much appreciated and claimed to be the first ML model deployed in production with 98% accuracy.

5. **Chatbot: 3 FAQ bots and 1 analytical bot built using RASA framework**

**Analyst- Apps Programmer, Bank of America, Chennai**

(Sep '19- Aug'20)

**ROLE: Leading 3 ML teams.**

**Projects under Tech with Ops:**

1. **QC inline Automation:**

**Synopsis:** End to end Automation model for QC Inline audit process. Fetch the appropriate file from the document repository, extract necessary information and produce the same to the operation team for validation.

**Roles and responsibility:** Team Lead and team player

**Summary:** Built table detection algorithm (TableNet) and Entity extraction model using custom object detection algorithm in Python.

2. **Image Enhancement for Kofax documents:**

**Synopsis:** Improve the quality of document fed into Kofax to increase readability.

**Roles and Responsibility:** Team Lead and team player

**Summary:** Image processing approaches and reverse engineering-based Auto encoder for Water mark and Salt & Pepper noise removal

3. Information Extraction from EOB Documents for HealthLogic Application:

Synopsis: Information from Explanation of Benefits (EOB) document such as the date of service, the code used to bill a particular service to an insurance company, the fee charged by the healthcare provider, the allowed amount under the third-party payer's contractual fee schedule and the payment made by the payer were to be extracted.

Roles and responsibility: Team Lead and team player

Summary: Custom Table detection and Text Mining model using YOLO3 and Tesseract

4. Loan Queue Allocation for Paycheck Protection Program (CARES Act):

Synopsis: The Paycheck Protection Program is a federal relief program to provide loans for Small Business Administrators who need support to restore their business from the impact of COVID-19. Huge amount of loans had to be performed Multiclass Classification to sync them in the relevant Queues for further processing.

Roles and responsibility: Team Lead and team player

Summary: Classified the loan applications based on documents availability in the repository, time stamp and additional natural language comments using XGBOOST and Random Forest classification models.

### Projects under ML/CoE:

1. Change Management:

Synopsis: Generate idiosyncratic samples from the entire distribution of change management database.

Roles and responsibility: Team Lead and team player

Summary: Multi class classification model built for major business change management requests using Shallow Neural Nets.

2. Financial Embedding:

Synopsis: Build custom word embedding for Bank documents for better accuracy in downstream Task

Summary: Transfer Learning based model for financial word embedding (ULMFiT and Elmo)

Downstream task: NER

### Achievements:

Pivotal member in Center of Excellence for analyzing designing and implementing Data Science/Artificial Intelligence products from unstructured text documents.

1. Patents and Publications

- Process flow graphs generation through Text Summaries – Filed Patent
- Gesture based Mobile App customization - Filed Patent
- Efficient TableNets for table information Extraction – Paper Publication
- Cognitive and quick responsive chatbots - Filed Patent

2. Recognized with **GOLD AWARD** for delivering QA Inline Automation Project well ahead of time and with good accuracy. Also, for building automation of Loan application prospects in a days' time.

3. Recognized with **SILVER AWARD** for contributing to CARES programme

4. Received **High Five Award** for contributing various SME sessions for Technology Focus Groups (TFG)

5. Recognized with **BRONZE AWARD** for building PoC towards Innovation day '19 event and filing patent

6. Appreciations from Client for building a robust model with a maximum accuracy of 98.23% (Change Management)

7. Pear appreciations for conducting SME sessions on

- Bio-Inspired Heuristics
- Deep Learning Fundamentals
- Hyper parameter fine tuning,
- Internet of Banking – IoT in Bank.

### COMPUTER VISION & NLP PROJECTS FOR BANK

1. Image/Hand-drawn Sketch to HTML Codes:

Synopsis: Model would generate HTML codes for UI design that could be a screenshot or a hand drawn Image.

Architecture: Inception Nets and LSTM

## 2. Signature Extraction:

Synopsis: Extract Signatures from Image Documents

Architecture: SSD

### SELF INTEREST PROJECTS

1. Data Scraping: Realtime Text Scraper:  
Synopsis: Text Scraper can extract text data from sites (Quora and Twitter) with multiple levels of navigation.  
Tool: Chromedriver
2. Conversational Agent: Chatbot for customer service:  
Synopsis: Simple Chatbot implementation built using rasa\_nlu and rasa\_core.
3. Text labeling: Semi Supervised Text labeling Model using Mahalanobis distance  
Synopsis: To ease the job of text labeling for building data designed a semi supervised model using mahalanobis distance metric using Adversarial Nets
4. Object Recognition: Fast RCNN  
Synopsis: A study on the fast region-CNN for object recognition (intention to enhance the model for text recognition from image) Model: Tensorflow API
5. Stock Price Prediction: Time Series Analysis  
Synopsis: A comparative study of ARIMA and LSTM model for predicting the stock Price.  
API and Modules: Keras for LSTM and statsmodels for ARIMA
6. Recommendation Systems: Collaborative Filtering  
Synopsis: Collaborative Filtering approaches with Cosine & Pearson measure. A comparative study of the models with baseline popularity model. Modules: numpy, sklearn, turicreate
7. Face Mask Detection: MobileNetV2  
Synopsis: Created augmented data with humans with mask by applying face landmarks and performed classification using MobileNetV2 with fully connected head.

### Technical Articles Written for MEDIUM

1. SAS Vs R Vs Python — Easy to Choose! - <https://medium.com/@madhugraj/sas-vs-r-vs-python-easy-to-choose-248835ea819c>
2. Domain Specific Language (DSL) — Introduction with simple Example - <https://medium.com/@madhugraj/domain-specific-language-dsl-introduction-with-simple-example-c182df8efb2e>
3. AI CAN RELIEVE EARTH FROM CORONA-19! - <https://medium.com/@madhugraj/ai-can-relieve-earth-from-corona-19-f505116f3178>

### OTHER PROJECTS

1. Inventory management system for Citi Bank – Mini Project ('03)
2. iButton Authentication System - Embedded system: Won third prize project award during inter-college competition for South zone ('04)
3. Clone attack – ID based attacks in WSN – (NS2 Implementation) ('12)
4. Quadcopter for traffic monitoring - (Raspberry Pi- Working Model) ('14)
5. Cluster based routing algorithm for 6LoWPAN-(NS2-Implementation) ('15)
6. Communication architecture for IoT - (Contiki Implementation) ('15)
7. Concept map based student evaluation tool for identifying the learning rate of students pertaining to a particular lecture class – (Cmap Tool) ('15)
8. Intelligent System For Control And Analysis Of Power Consumption In Homes-(IoT/Raspberry Pi Model) ('15)

### OVERALL WORK EXPERIENCE

#### Research Scholar, SRM University, Kattankulathur, Chennai

(June '17 – present)

Research Scholar working in NLP- Deep learning domain. Intentionally mastering the Text handling techniques to construct solutions for various Natural Language applications.

#### Assistant Professor, SRM University, Vadapalani, Chennai

(June'12-June'17)

Had undertaken crucial responsibilities like Project coordinator, Time-table coordinator, Student-affair Head and Mentor. Had handled core labs like data structures, programming labs, operating Systems and other CSE core labs several times. Have designed curriculum for few labs and Elective subjects. Had been the editor for Department Newsletter #include.h. Had designed Certificates and Invitations for various curricular and co-curricular programs.

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Github: <https://github.com/madhugraj>

**Assistant Professor, Meenakshi College of Engineering, Chennai**

(July '07- June '12)

Arranged nearly 48 Seminars, 8 Workshops (On board and Outside Campus). Co-ordinated a two-day Intra-College Symposium, Silex-10 with one day workshop on Data Mining and Cryptography. Had been an editor for the Newsletter Committee of IT Dept. Guided for the First National level Symposium conducted by IT Department, Flaminius 08. Had also been Class-Advisor, Timetable in-charge and Project Coordinator.

#### EDUCATION

**SRM University**

**CHENNAI, INDIA**

June '17 – present

***PhD* COMPUTER SCIENCE & ENGINEERING**

**ANNA UNIVERSITY**

ME COMPUTER SCIENCE & ENGINEERING

GPA (7.8/10)

**CHENNAI, INDIA**

June '09 – June '12

**AVINASHILINGAM DEEMED UNIVERSITY**

B.E COMPUTER HARDWARE & SOFTWARE ENGINEERING GPA (8.5/10)

**COIMBATORE, INDIA**

2000-2004

#### PAPER PUBLICATIONS

##### Papers Published:

- [IPainRelief -A pain assessment and management app for a smart phone implementing sensors and soft computing tools](#)
- [On recognizing ID based attacks using environs and beam forming approach for wireless sensor networks](#)
- [On proposing automobile accident prevention system \(A2PS\) using wireless sensors and zigbee technology](#)
- A Study on Key Management Issues in Wireless Sensor Network

##### Unpublished papers:

- Introduction of Cluster Based Routing Algorithm for 6LoWPAN Networks
- Communication Architectural Utility for Internet of Things – Won Silver Medal in SRM Research day '15
- SET (Student Evaluation Tool) – CMap based Probabilistic and Semantic Assessment Tool for Analyzing Student's Knowledge towards a Topic.

#### ONLINE COURSE AND CERTIFICATION

- <https://www.coursera.org/account/accomplishments/certificate/UL3H33M4G9V8>
- <https://www.coursera.org/account/accomplishments/certificate/JUUA9DLLMMF4>
- <https://www.coursera.org/account/accomplishments/certificate/XE8K4BVTPKJY>
- <https://www.coursera.org/account/accomplishments/certificate/WRUQVQAT9Z8J>
- <https://www.coursera.org/account/accomplishments/certificate/6SBST799D7RW>
- <https://www.coursera.org/account/accomplishments/specialization/certificate/VQQ4WNVDWXXKB>

#### AWARDS

**Gold Award**

**(May '20)**

**Bronze Award**

**(Dec'19)**

**Best Project Award**

**(April '04)**

**Best Teacher Award**

**(May'17)**

#### IT TOOLS

Ability to prototype in Pytorch, TensorFlow, Keras, C

Knowledge in RASA, Colab, Anaconda, Photoshop, PyCharm, Jupyter Lab, github

Interested in Kore.ai, Dialogueflow

Worked in CPU and GPU (GTX 1080)

Regular reader and article writer in stackoverflow, Medium

#### COURSEWORK

Research Methodology

Machine Learning

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E-Mail: [madhugraj@gmail.com](mailto:madhugraj@gmail.com);

Github: <https://github.com/madhugraj>

#### FIELD OF INTEREST

Deep learning, NLP, Computer vision, Automation, Data Structures, Technical Article Writing

#### PERSONAL SKILLS

Comprehensive problem-solving abilities, Leadership, Excellent verbal and written communication skills, Ability to deal with people diplomatically, Willingness to learn, hardworking and very fast Learner.

#### PERSONAL DETAILS

Female, DOB:05.05.1983, Married, Indian

Address: Prestige Bella Vista, 8022, Tower 8, Iyyappanthangal, Chennai-600056

Passport No: U7429585

Hobby: Intensive Reader of Technical Papers, Passionate Badminton Player, Technical writer

Recent Achievement: Won runners up in Women's Day Badminton tournament (2020)

#### SUMMARY

I am attracted towards Computer Vision and Natural Language Processing challenges. My primary area of interest is in developing customized and efficient Deep Learning Architectures. More broadly, I am fascinated in exploring CV and NLP applications and derive solutions that scale to a multiple product. I am favorited in playing around text data within readable and image documents for any downstream tasks.

Other problems of interest

- Tool Evaluation
- Object detection
- Conversational Agents
- Text Generation
- Hyper parameter finetuning