**CHAPTER 1**

**ABOUT THE COMPANY**

**1.1. INTRODUCTION**

TCS iON is a strategic unit of Tata Consultancy Services focused on Manufacturing Industries (SMB), Educational Institutions and Examination Boards. TCS iON provides technology by means of a unique IT-as-a-Service model, offering end-to-end business solutions. It caters to the needs of multiple industry segments, through innovative, easy-to-use, secured, integrated, hosted solutions in a build-as-you-grow, pay-as-you-use business model. TCS iON serves its clients with the help of best practices gained through TCS' global experience, domestic market reach, skills, and delivery capabilities. TCS iON's Cloud Based Solution is highly modular, scalable and configurable giving businesses and educational institutions the benefits of increased efficiencies, faster go to market, predictability of technology as well as spend and better business results.

**1.1.1. INTEGRATED SOLUTIONS**

They as a cloud-based solution offer single-window IT with a pre-integrated suite of hardware, network, software and services. TCS iON ensures that the functions are digitized, automated and connected. For example, if you are using a CRM solution along with a core ERP (e.g. a Manufacturing ERP) and have a document management system to organize supporting files and an HRMS, we ensure that these solutions are connected and work as one. So, for the customers, it is simply one IT and not multiple applications. Integrated applications thus provide a comprehensive view of business enabling better decisions.

**1.1.2. INCREASED AGILITY**

TCS iON brings in the agility to keep pace with changing processes or a new line of business. They help you configure the processes to work as you currently do or the software recommends and allows you to choose industry best practices based on your business parameters. TCS iON gives you increased convenience allowing you to perform various tasks from your mobile device, no matter where you are. Being automatically compliant with statutory requirements, the solution ensures your company is always audit ready and legally compliant.

**1.1.3. A PAY-AS-YOU-USE MODEL**

Their model eliminates capital investment up front as we facilitate procurement of the IT infrastructure and software on rent for the duration of the contract. Additionally, you only pay for the number of users who actually use the solution. Thus, you pay as you use on a monthly basis which includes maintenance and training. Typically, with the TCS iON cloud-based solutions, the ROI exceeds rental within three months, when best practices are well followed.

**1.1.4. PERSONALIZED SOLUTIONS**

Although TCS iON is a cloud service for education, exam boards and manufacturing, the software is configurable to each sector. You will always get the flavor of your business by picking and choosing what processes you would need. Furthermore, the multilingual capability of the solution allows you to customize the solution label names to read in vernacular languages (like Hindi, Marathi, Tamil etc.­) enabling users to learn and operate the solution with ease.

**1.1.5. AUTO UPGRADES**

They continuously invest in our cloud-based solutions to incorporate best practices. The solution is constantly enriched based on user feedback and industry and statutory changes. You will get the upgrades without disrupting your business operations or any additional cost. Being in perpetual beta ensures that there is no technology obsolescence.

**1.1.6. ENHANCED BUSINESS CONTINUITY**

Their solution offers optimal performance in normal broadband connectivity along with a stringent security mechanism to ensure your data privacy is maintained. The capacity of the TCS iON cloud-based solution grows with your increasing computing needs and reduces the need for IT staff. The solution is resilient to failures as the service works from back-up data centers in the event of a disaster, ensuring continuity of business operations.

**CHAPTER 2**

**OVERVIEW OF THE ORGANIZATION**

**2.1. EDUCATION**

**2.1.1. K12**

In the competitive world, every institution faces varied challenges while working on its main goal of imparting quality education. As an institute head, you not only have to ensure the admissions for the financial year are conducted on time, but also obtain accreditation for your institution, seek affiliation, and ensure compliance. As an educator, you have to create lesson plans, keep track of students' attendance, prepare the daily timetable, and monitor the quality of content delivered to learners.

**Addressing the Challenges**

* To help educational institutions overcome the challenges, we begin by digitizing all student lifecycle processes such as admissions, exams and grading, lesson planning, and community collaboration.
* This allows key stakeholders to view the entire transactional history of the student from admission to separation on a single screen.
* The solution's availability on the cloud allows stakeholders to have seamless access to such information from anywhere across the globe.
* It also enables institutions to conduct digital evaluations and offers communications tools to facilitate seamless communication between students and the institute.

**2.1.2. HIGHER EDUCATION**

With an increasing emphasis on personalized learning, the education sector is witnessing a radical transformation in the technology landscape. The adoption of online learning platforms and the move to cloud-based solutions are some of the changes. In the process of imparting progressive and quality education, institutions face several challenges including:

* Streamlining the admission process.
* Achieving accreditation, affiliation, and regulatory compliance.
* Ensuring accountability.
* Optimizing costs.
* Creating an active learning environment to improve learning outcomes.

**2.1.3. PROFESSIONAL TRAINING**

Professional education prepares students to work in the real world. It aims to hone the practical skills of students, which will help them pursue jobs in the fields of their choosing unlike classroom training, where the focus is generally on academics. However, professional education has not yet evolved enough to effectively address these challenges:

* Lack of job-ready youth with updated skills
* Lack of trainers who can provide quality training
* An insufficient number of career service centers that can provide career counselling, disseminate information and guide job seekers.

**2.2. MANUFACTURING**

**2.2.1. AUTOMOTIVE COMPONENT**

Automotive component manufacturers need to improve operational efficiencies and implement best-in-class shop floor practices- to meet high quality standards and ensure faster turn-around and JIT delivery. These parameters need to be met even while working on high volumes.  
The iON Manufacturing Solution for the automotive component industry helps:

* Automate your production planning and control process (PPC) and enable material requirement planning
* Trigger job orders and purchase orders to run just-in-time inventory
* Reduce cost by making your production faster and leaner
* Improve product quality through stringent quality control at different levels, including raw material, semi-finished goods, and processes.

**2.2.2. PHARMACEUTICAL**

The pharmaceutical industry in India is faced with challenges such as cheap imports and increased scrutiny from US FDA. As a result, the industry requires a balanced mix of imported and domestically purchased active pharmaceutical ingredients (API), efficient supply chain management and on-going R&D. The TCS iON Manufacturing Solution is a domain-centric, analytics-driven cloud solution which offers an integrated view of operations across the organization. The iON Manufacturing Solution for the pharmaceutical industry helps

* Manage procurement efficiently and maintain the right level of inventory
* Get real-time information and complete visibility into demand cycles
* Facilitate better planning
* Manage compliance through automatic generation of certificate of analysis
* Track licensing status.

**2.2.3. PROCESS INDUSTRY**

Manufacturing Solution offers consulting-driven ERP implementation to overcome these challenges and accelerate business performance.

Process manufacturers face dynamic industry challenges such as:

* Variations in bills of material (BoM)
* Complex inventory management processes
* Inaccurate raw material consumption measurement
* Insufficient safety stock

**2.3. EXAM BOARDS**

Exam boards comprise school boards and examination bodies that are tasked with the crucial role of conducting large scale and high-stake assessments. Some of the common challenges faced by examination boards include:

* Time consuming manual processes.
* Lack of subject matter experts to prepare question banks.
* Question paper leakage or damage during transit.

**CHAPTER 3**

# PLAN OF THE INTERNSHIP PROGRAM

**3.1. BRIEF INTRODUCTION OF BRANCH OR DEPARTMENT WHERE INTERNSHIP WAS PERFORMED:**

The internship was perused at TCS iON. TCS iON is a strategic unit of Tata Consultancy Services and has a broad range of expertise in Computer Science, Software Engineering, Product Development and IT for Business needs; in managing projects for large enterprises; and in executing and managing data management projects.

**3.2. THE STARTING AND END DATES OF THE INTERNSHIP:**

The internship was a one-month internship programme, commenced from **16th January 2019** and went on to complete by **10th February 2019**. During this course of time, team project was allocated which had to be worked upon.

**CHAPTER 4**

# TRAINING PROGRAM

**Duties and responsibilities performed:**

During the internship, a project was allocated to work with in a team. The project was an integrated work of Dog Breed Classification using Deep CNN. Initially, a survey on the requirements were conducted and then proceeded to the outline of the development, collection of the required data and a study on the datasets during the first week of work. During the next week, a session on Python and CNN were conducted and focused on the front end. After that, the work proceeded with the design phase which lead to the development of the by the end of the second week. During the third week, the algorithms and the models required for the project were planned and simultaneously the models to detect Humans and Dogs were designed, trained and tested. In the last week, the CNN Models were implemented to classify the dog breeds which was then trained and tested. Parallelly the algorithm that accepts a file path to image and determines whether the image contains a dog or human was coded and implemented. Finally, Modelling Metrics was used to analyze the model performance. The project was concluded and worked towards improving the overall design, performance and efficiency of the system.

**CHAPTER 5**

# LEARNING EXPERIENCES

1. **Knowledge acquired:**

The knowledge gained in the training is about Machine Learning. I have learnt many things on Machine Learning and Artificial Intelligence as well. And the concepts of Machine Learning such as CNN (Convoluted Neural Networks), Deep Learning. Projects on Machine Learning were conducted and solving of the hands-on and use-cases in it and found the solutions to it. Implemented the concepts for various use cases in the Machine Learning Projects. Worked and performed the testing on the product**.**

1. **Skills learned:**

The main skill acquired in the internship is to work well as a team and free to ask doubts. The practical experience in reading the use-cases and understanding the need and analyzing the problem and finding a solution to it. Projects conducted in group and group discussion helped in finding the solution as the team work helps to get more ideas. Internships provided the hands-on experience needed. Hence, internships are essential to develop key skills. It helps to support knowledge of responsibility, focus, energy and motivation.

1. **Observed attitudes and gained values:**

The value gained is to work hard even if the task is small and it seems unimportant. It will helps to build a good work idea, and the people will notice the effort that has been put in. The opportunity given must be utilized till the peak. time. Taking the advices of the coworkers with experience request some advices that can be provisioned. Internship enhances the skills and ability to work in a team. Internship helps to gain experience and develop interpersonal skills.

1. **The most challenging task performed:**

The most challenge was travelling. Because the place was bit far, it was not easy to always be there on time because there was always traffic jam in city especially in KR Puram. This would enable that one wakes up very early and go.

**CHAPTER 6**

# SWOT ANALYSIS

**STRENGTH**

The internship helped in identifying my strengths, weakness, the opportunities and the threats. It also means that we have learned many things. My strength in the internship is I am a good team builder. We worked with the superior and the staffs. We worked in a team. As a member of team, I am responsible in group discussion and giving my own opinions. If there was anything that I am not able to understand I would ask besides that I am a cooperative person. I am able to give cooperation to anyone. I am also approachable and an easily adaptable person because I am able to approach the branches staff and I am able to adapt with different situation easily.

**WEAKNESS**

My weakness during internship were, I am not comfortable to work under pressure. Before this, I thought I am someone that is competent to work under pressure. I have realized that still did not know myself very well. Besides since I am still new in the field, am lacking in terms of planning, making decisions and business plan. I am quite weak in receiving information therefore I need to be carefully listened to what guide brief out to me and I need to take note immediately what have been assigned to me.

**OPPURTUNITIES**

The opportunities that I have gained from this internship are, I am able to gain more experience and knowledge, and also build a relationship with colleagues and customers. I am not a tough person but since I am working in internship, it demanded me to embrace myself in dealing with senior staff.in fact, I think this is among the best things I had experienced. Moreover, I was able to increase my knowledge.

**THREATS**

Threats arises when conditions in external environment affects the reliability and profitability of the organization’s business. They compound the vulnerability when they relate to the weakness. Threats are uncontrollable like unrest among employees, ever changing technologies, increasing competition leading to excess capacity, price wars and reducing industry profits. During this internship we decided to do project on java but due to change in technologies, we executed the project in python.

**CHAPTER 7**

# PROBLEM IDENTIFICATION AND SOLUTION

**7.1. Problem identification:**

The objective of the project is to train the neural network to detect the different breeds/classification of dogs

**7.2. Dimension of Data:**

Two datasets are used here:

1. Human Dataset

* The Human Dataset being used contains 5749 human faces.
* It consists of one column: Images of the human faces.

1. Dog Dataset

* The dog dataset contains 836 images with 133 categories for test data.
* The training dataset contains 6680 images with 133 categories.

**7.3. Description of Models:**

* **Detect Humans**

Humans can be detected by accessing the Human Face Detector used in natural language processing and information retrieval. In this model, the submission returns the percentage of the first 100 images in the dog and human face datasets with a detected human face.

OpenCV's implementation of [Haar feature-based cascade classifiers](http://docs.opencv.org/trunk/d7/d8b/tutorial_py_face_detection.html) to detect human faces in images is used. OpenCV provides many pre-trained face detectors, stored as XML files.

## **Detect Dogs**

## In this section, a pre-trained [ResNet-50](http://ethereon.github.io/netscope/#/gist/db945b393d40bfa26006) model to detect dogs in images is used. The first line of code downloads the ResNet-50 model, along with weights that have been trained on [ImageNet](http://www.image-net.org/), a very large, very popular dataset used for image classification and other vision tasks. ImageNet contains over 10 million URLs, each linking to an image containing an object from one of [1000 categories](https://gist.github.com/yrevar/942d3a0ac09ec9e5eb3a). Given an image, this pre-trained ResNet-50 model returns a prediction (derived from the available categories in ImageNet) for the object that is contained in the image.

**7.4. CNN Model to Classify Dog Breeds:**

* In this step, a CNN that classifies dog breeds is created. The CNN is created from scratch and a test accuracy of at least 1% has to be attained.
* Keras provides a handy estimate of the time that each epoch is likely to take; one can extrapolate this estimate to figure out how long it will take for your algorithm to train.

**7.5. Designing the Algorithm:**

The algorithm shall accept a file path to an image and first determines whether the image contains a human, dog, or neither. Then:

* if a **dog** is detected in the image, return the predicted breed.
* if a **human** is detected in the image, return the resembling dog breed.
* if **neither** is detected in the image, provide output that indicates an error.

**CHAPTER 8**

# CONCLUSION

The internship program helped to increase knowledge on software industry, their culture, work environment and all about software environment. Solving projects and solving use cases helped to build confidence and never give up approach. At the same time helped to learn the life-cycle of software industry and encouraged to be responsible and confident. This internship program has increased the team work abilities as well as respect to the team mate’s ideas and suggestions. The atmosphere at TCS iON office was always comfortable which motivated to work happily. On the whole, this internship was a useful experience.

I would like to convey my thanks to TCS iON for providing me an opportunity to gain idea of the competitive environment in professional field. It surely developed the software skills. Overall, internship at TCS iON has been success.

**CHAPTER 9**

# REFERENCES AND SOURCES USED

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