# Medi-Caps Institute of Technology and Management

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MACHINE LEARNING CAPTCHA RECOGNITION

A Minor Project Report Submitted to

Rajiv Gandhi ProudyogikiVishwavidyalaya, Bhopal

In partial fulfilment of the degree

of

Bachelor of Engineering

In

**ELECTRONICS AND INSTRUMENTATION**

Submitted To : Submitted By :

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**CERTIFICATE**

This is to certify thatAayush Bhargava(0812EI141001)has completed his Minor project work titled **“MACHINE LEARNING CAPTCHA RECOGNITION”** as per the curriculum and submitted a satisfactory report on this project as a part of fulfilment towards the degree of **Bachelor of Engineering (ELECTRONICS AND INSTRUMENTATION)** from **Rajiv Gandhi ProudyogikiVishwavidyalaya, Bhopal.**

Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(Internal Examiner) (External Examiner)

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**INTRODUCTION TO OPTICAL CHARACTER RECOGNITION**

Optical character recognition (also optical character reader, OCR) is the [mechanical](https://en.wikipedia.org/wiki/Machine) or [electronic](https://en.wikipedia.org/wiki/Electronics) conversion of [images](https://en.wikipedia.org/wiki/Image) of typed, handwritten or printed text into machine-encoded text, whether from a scanned document, a photo of a document, a scene-photo (for example the text on signs and billboards in a landscape photo) or from subtitle text superimposed on an image (for example from a television broadcast).[[1]](https://en.wikipedia.org/wiki/Optical_character_recognition#cite_note-1) It is widely used as a form of information entry from printed paper data records, whether passport documents, invoices, bank statements, computerised receipts, business cards, mail, printouts of static-data, or any suitable documentation. It is a common method of digitising printed texts so that they can be electronically edited, searched, stored more compactly, displayed on-line, and used in machine processes such as [cognitive computing](https://en.wikipedia.org/wiki/Cognitive_computing), [machine translation](https://en.wikipedia.org/wiki/Machine_translation), (extracted) [text-to-speech](https://en.wikipedia.org/wiki/Text-to-speech), key data and [text mining](https://en.wikipedia.org/wiki/Text_mining). OCR is a field of research in [pattern recognition](https://en.wikipedia.org/wiki/Pattern_recognition), [artificial intelligence](https://en.wikipedia.org/wiki/Artificial_intelligence) and [computer vision](https://en.wikipedia.org/wiki/Computer_vision).

Early versions needed to be trained with images of each character, and worked on one font at a time. Advanced systems capable of producing a high degree of recognition accuracy for most fonts are now common, and with support for a variety of digital image file format inputs.[[2]](https://en.wikipedia.org/wiki/Optical_character_recognition#cite_note-2) Some systems are capable of reproducing formatted output that closely approximates the original page including images, columns, and other non-textual components.

**Types**

Optical character recognition (OCR) – targets typewritten text, one [glyph](https://en.wikipedia.org/wiki/Glyph) or [character](https://en.wikipedia.org/wiki/Character_(symbol)) at a time.

**Optical word recognition** – targets typewritten text, one word at a time (for languages that use a [space](https://en.wikipedia.org/wiki/Space_(punctuation)) as a [word divider](https://en.wikipedia.org/wiki/Word_divider)).(Usually just called "OCR").

[**Intelligent character recognition**](https://en.wikipedia.org/wiki/Intelligent_character_recognition)**(ICR)** – also targets handwritten [print script](https://en.wikipedia.org/wiki/Printscript) or [cursive](https://en.wikipedia.org/wiki/Cursive) text one glyph or character at a time, usually involving [machine learning](https://en.wikipedia.org/wiki/Machine_learning).

[**Intelligent word recognition**](https://en.wikipedia.org/wiki/Intelligent_word_recognition)**(IWR)** – also targets handwritten [printscript](https://en.wikipedia.org/wiki/Printscript" \o "Printscript) or [cursive](https://en.wikipedia.org/wiki/Cursive) text, one word at a time. This is especially useful for languages where glyphs are not separated in cursive script.

OCR is generally an "offline" process, which analyses a static document. [Handwriting movement analysis](https://en.wikipedia.org/wiki/Handwriting_movement_analysis) can be used as input to [handwriting recognition](https://en.wikipedia.org/wiki/Handwriting_recognition).[[13]](https://en.wikipedia.org/wiki/Optical_character_recognition#cite_note-13) Instead of merely using the shapes of glyphs and words, this technique is able to capture motions, such as the order in which [segments](https://en.wikipedia.org/wiki/Segment_(handwriting)) are drawn, the direction, and the pattern of putting the pen down and lifting it. This additional information can make the end-to-end process more accurate.

**INTRODUCTION TO PYTHON**

**Python** is a [widely used](https://en.wikipedia.org/wiki/Measuring_programming_language_popularity) [high-level programming language](https://en.wikipedia.org/wiki/High-level_programming_language) for [general-purpose programming](https://en.wikipedia.org/wiki/General-purpose_programming_language), created by [Guido van Rossum](https://en.wikipedia.org/wiki/Guido_van_Rossum) and first released in 1991. An [interpreted language](https://en.wikipedia.org/wiki/Interpreted_language), Python has a design philosophy which emphasizes code [readability](https://en.wikipedia.org/wiki/Readability) (notably using [whitespace](https://en.wikipedia.org/wiki/Whitespace_character) indentation to delimit [code blocks](https://en.wikipedia.org/wiki/Code_block) rather than curly braces or keywords), and a syntax which allows programmers to express concepts in fewer [lines of code](https://en.wikipedia.org/wiki/Source_lines_of_code) than possible in languages such as [C++](https://en.wikipedia.org/wiki/C%2B%2B) or [Java](https://en.wikipedia.org/wiki/Java_(programming_language)) The language provides constructs intended to enable writing clear programs on both a small and large scale

Python features a [dynamic type](https://en.wikipedia.org/wiki/Dynamic_type) system and automatic [memory management](https://en.wikipedia.org/wiki/Memory_management) and supports multiple [programming paradigms](https://en.wikipedia.org/wiki/Programming_paradigm), including [object-oriented](https://en.wikipedia.org/wiki/Object-oriented_programming), [imperative](https://en.wikipedia.org/wiki/Imperative_programming), [functional programming](https://en.wikipedia.org/wiki/Functional_programming), and [procedural](https://en.wikipedia.org/wiki/Procedural_programming) styles. It has a large and comprehensive [standard library](https://en.wikipedia.org/wiki/Standard_library).

Python interpreters are available for many [operating systems](https://en.wikipedia.org/wiki/Operating_system), allowing Python code to run on a wide variety of systems. [CPython](https://en.wikipedia.org/wiki/CPython), the [reference implementation](https://en.wikipedia.org/wiki/Reference_implementation) of Python, is [open source](https://en.wikipedia.org/wiki/Open_source) softwareand has a community-based development model, as do nearly all of its variant implementations. CPython is managed by the non-profit [Python Software Foundation](https://en.wikipedia.org/wiki/Python_Software_Foundation).

**IMAGE PROCESSING**

Specifying and iterating, images for training

Gray scale conversion

Thresholding

Contouring

Finding ROI and making a rectangle around LETTER

Resizing and Gaussian blur and OTSU thresholding (30x30)

Pre-processing and saving it to .txt file

Conversion to NUMPY array (0 and 1’s)

Morphological Transformation

**CAPTCHA PROCESSING**

Specifying the Captcha address for prediction

Contouring

Gray scale conversion

Thresholding and Resizing and Morphological erosion

Finding ROI and making a rectangle around every Letter in the Captcha

Finding area of contour and threshold it to avoid unnecessary contours

X-axis manipulation to rearrange contours of every letter in Captcha in desired order

Resizing (30x30) every separated letter of Captcha and applying Gaussian blur, OTSU thresholding

Conversion to NUMPY array (0 and 1’s)

Morphological Transformation

Pre-processing and saving every letter of Captcha in desired format to .txt file

**MACHINE LEARNING**

**(SUPPORT VECTOR MACHINE)**

Machine learning is the subfield of [computer science](https://en.wikipedia.org/wiki/Computer_science) that, according to [Arthur Samuel](https://en.wikipedia.org/wiki/Arthur_Samuel) in 1959, gives "computers the ability to learn without being explicitly programmed."[[1]](https://en.wikipedia.org/wiki/Machine_learning#cite_note-1) Evolved from the study of [pattern recognition](https://en.wikipedia.org/wiki/Pattern_recognition) and [computational learning theory](https://en.wikipedia.org/wiki/Computational_learning_theory) in [artificial intelligence](https://en.wikipedia.org/wiki/Artificial_intelligence),[[2]](https://en.wikipedia.org/wiki/Machine_learning#cite_note-Britannica-2) machine learning explores the study and construction of [algorithms](https://en.wikipedia.org/wiki/Algorithm) that can learn from and make predictions on [data](https://en.wikipedia.org/wiki/Data)[[3]](https://en.wikipedia.org/wiki/Machine_learning#cite_note-3) – such algorithms overcome following strictly static [program instructions](https://en.wikipedia.org/wiki/Computer_program) by making data-driven predictions or decisions,[[4]](https://en.wikipedia.org/wiki/Machine_learning#cite_note-bishop-4):2 through building a [model](https://en.wikipedia.org/wiki/Mathematical_model) from sample inputs. Machine learning is employed in a range of computing tasks where designing and programming explicit algorithms with good performance is difficult or unfeasible; example applications include [email filtering](https://en.wikipedia.org/wiki/Email_filtering), detection of network intruders or malicious insiders working towards a [data breach](https://en.wikipedia.org/wiki/Data_breach),[[5]](https://en.wikipedia.org/wiki/Machine_learning#cite_note-5) [optical character recognition](https://en.wikipedia.org/wiki/Optical_character_recognition) (OCR),[[6]](https://en.wikipedia.org/wiki/Machine_learning#cite_note-Wernick-Signal-Proc-July-2010-6) [learning to rank](https://en.wikipedia.org/wiki/Learning_to_rank) and [computer vision](https://en.wikipedia.org/wiki/Computer_vision).

Machine learning is closely related to (and often overlaps with) [computational statistics](https://en.wikipedia.org/wiki/Computational_statistics), which also focuses on prediction-making through the use of computers. It has strong ties to [mathematical optimization](https://en.wikipedia.org/wiki/Mathematical_optimization), which delivers methods, theory and application domains to the field. Machine learning is sometimes conflated with [data mining](https://en.wikipedia.org/wiki/Data_mining),[[7]](https://en.wikipedia.org/wiki/Machine_learning#cite_note-7) where the latter subfield focuses more on exploratory data analysis and is known as [unsupervised learning](https://en.wikipedia.org/wiki/Unsupervised_learning).[[4]](https://en.wikipedia.org/wiki/Machine_learning#cite_note-bishop-4):vii[[8]](https://en.wikipedia.org/wiki/Machine_learning" \l "cite_note-8) Machine learning can also be unsupervised[[9]](https://en.wikipedia.org/wiki/Machine_learning#cite_note-9) and be used to learn and establish baseline behavioral profiles for various entities[[10]](https://en.wikipedia.org/wiki/Machine_learning#cite_note-10) and then used to find meaningful anomalies.

Within the field of [data analytics](https://en.wikipedia.org/wiki/Data_analytics), machine learning is a method used to devise complex models and algorithms that lend themselves to prediction; in commercial use, this is known as [predictive analytics](https://en.wikipedia.org/wiki/Predictive_analytics). These analytical models allow researchers, [data scientists](https://en.wikipedia.org/wiki/Data_science), engineers, and analysts to "produce reliable, repeatable decisions and results" and uncover "hidden insights" through learning from historical relationships and trends in the data.[[11]](https://en.wikipedia.org/wiki/Machine_learning#cite_note-11)

As of 2016, machine learning is a [buzzword](https://en.wikipedia.org/wiki/Buzzword), and according to the Gartner [hype cycle](https://en.wikipedia.org/wiki/Hype_cycle) of 2016, at its peak of inflated expectations.[[12]](https://en.wikipedia.org/wiki/Machine_learning#cite_note-12) Because finding patterns is hard, often not enough training data is available, and also because of the high expectations it often fails to deliver.

## Approaches

### Decision tree learning

Decision tree learning uses a [decision tree](https://en.wikipedia.org/wiki/Decision_tree) as a [predictive model](https://en.wikipedia.org/wiki/Predictive_modelling), which maps observations about an item to conclusions about the item's target value.

### Association rule learning

Association rule learning is a method for discovering interesting relations between variables in large databases.

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### Artificial neural networks

An [artificial neural network](https://en.wikipedia.org/wiki/Artificial_neural_network) (ANN) learning algorithm, usually called "neural network" (NN), is a learning algorithm that is inspired by the structure and functional aspects of [biological neural networks](https://en.wikipedia.org/wiki/Biological_neural_networks). Computations are structured in terms of an interconnected group of [artificial neurons](https://en.wikipedia.org/wiki/Artificial_neuron), processing information using a [connectionist](https://en.wikipedia.org/wiki/Connectionism) approach to [computation](https://en.wikipedia.org/wiki/Computation). Modern neural networks are [non-linear](https://en.wikipedia.org/wiki/Non-linear) [statistical](https://en.wikipedia.org/wiki/Statistical) [data modeling](https://en.wikipedia.org/wiki/Data_modeling) tools. They are usually used to model complex relationships between inputs and outputs, to [find patterns](https://en.wikipedia.org/wiki/Pattern_recognition) in data, or to capture the statistical structure in an unknown [joint probability distribution](https://en.wikipedia.org/wiki/Joint_probability_distribution) between observed variables.

### Deep learning

Falling hardware prices and the development of [GPUs](https://en.wikipedia.org/wiki/GPU) for personal use in the last few years have contributed to the development of the concept of [Deep learning](https://en.wikipedia.org/wiki/Deep_learning) which consists of multiple hidden layers in an artificial neural network. This approach tries to model the way the human brain processes light and sound into vision and hearing. Some successful applications of deep learning are [computer vision](https://en.wikipedia.org/wiki/Computer_vision) and [speech recognition](https://en.wikipedia.org/wiki/Speech_recognition).

**Inductive logic programming**

Inductive logic programming (ILP) is an approach to rule learning using [logic programming](https://en.wikipedia.org/wiki/Logic_programming) as a uniform representation for input examples, background knowledge, and hypotheses. Given an encoding of the known background knowledge and a set of examples represented as a logical database of facts, an ILP system will derive a hypothesized logic program that [entails](https://en.wikipedia.org/wiki/Entailment) all positive and no negative examples. [Inductive programming](https://en.wikipedia.org/wiki/Inductive_programming) is a related field that considers any kind of programming languages for representing hypotheses (and not only logic programming), such as [functional programs](https://en.wikipedia.org/wiki/Functional_programming).

### Support vector machines

Support vector machines (SVMs) are a set of related [supervised learning](https://en.wikipedia.org/wiki/Supervised_learning) methods used for [classification](https://en.wikipedia.org/wiki/Statistical_classification) and [regression](https://en.wikipedia.org/wiki/Regression_analysis). Given a set of training examples, each marked as belongingto one of two categories, an SVM training algorithm builds a model that predicts whether a new example falls into one category or the other.

### Clustering

Cluster analysis is the assignment of a set of observations into subsets (called *clusters*) so that observations within the same cluster are similar according to some predesignated criterion or criteria, while observations drawn from different clusters are dissimilar. Different clustering techniques make different assumptions on the structure of the data, often defined by some *similarity metric* and evaluated for example by *internal compactness* (similarity between members of the same cluster) and *separation* between different clusters. Other methods are based on *estimated density* and *graph connectivity*. Clustering is a method of [unsupervised learning](https://en.wikipedia.org/wiki/Unsupervised_learning), and a common technique for [statistical](https://en.wikipedia.org/wiki/Statistics) [data analysis](https://en.wikipedia.org/wiki/Data_analysis).

### Bayesian networks

A Bayesian network, belief network or directed acyclic graphical model is a [probabilistic graphical model](https://en.wikipedia.org/wiki/Graphical_model) that represents a set of [random variables](https://en.wikipedia.org/wiki/Random_variables) and their [conditional independencies](https://en.wikipedia.org/wiki/Conditional_independence) via a [directed acyclic graph](https://en.wikipedia.org/wiki/Directed_acyclic_graph) (DAG). For example, a Bayesian network could represent the probabilistic relationships between diseases and symptoms. Given symptoms, the network can be used to compute the probabilities of the presence of various diseases. Efficient algorithms exist that perform [inference](https://en.wikipedia.org/wiki/Inference) and learning.

### Reinforcement learning

Reinforcement learning is concerned with how an *agent* ought to take *actions* in an *environment* so as to maximize some notion of long-term *reward*. Reinforcement learning algorithms attempt to find a *policy* that maps *states* of the world to the actions the agent ought to take in those states. Reinforcement learning differs from the [supervised learning](https://en.wikipedia.org/wiki/Supervised_learning) problem in that correct input/output pairs are never presented, nor sub-optimal actions explicitly corrected.

### Representation learning

Several learning algorithms, mostly [unsupervised learning](https://en.wikipedia.org/wiki/Unsupervised_learning) algorithms, aim at discovering better representations of the inputs provided during training. Classical examples include [principal components analysis](https://en.wikipedia.org/wiki/Principal_components_analysis) and [cluster analysis](https://en.wikipedia.org/wiki/Cluster_analysis). Representation learning algorithms often attempt to preserve the information in their input but transform it in a way that makes it useful, often as a pre-processing step before performing classification or predictions, allowing reconstruction of the inputs coming from the unknown data generating distribution, while not being necessarily faithful for configurations that are implausible under that distribution.

[Manifold learning](https://en.wikipedia.org/wiki/Manifold_learning) algorithms attempt to do so under the constraint that the learned representation is low-dimensional. [Sparse coding](https://en.wikipedia.org/wiki/Sparse_coding) algorithms attempt to do so under the constraint that the learned representation is sparse (has many zeros). [Multilinear subspace learning](https://en.wikipedia.org/wiki/Multilinear_subspace_learning) algorithms aim to learn low-dimensional representations directly from [tensor](https://en.wikipedia.org/wiki/Tensor) representations for multidimensional data, without reshaping them into (high-dimensional) vectors.[[27]](https://en.wikipedia.org/wiki/Machine_learning#cite_note-27) [Deep learning](https://en.wikipedia.org/wiki/Deep_learning) algorithms discover multiple levels of representation, or a hierarchy of features, with higher-level, more abstract features defined in terms of (or generating) lower-level features. It has been argued that an intelligent machine is one that learns a representation that disentangles the underlying factors of variation that explain the observed data.

**Similarity and metric learning**

In this problem, the learning machine is given pairs of examples that are considered similar and pairs of less similar objects. It then needs to learn a similarity function (or a distance metric function) that can predict if new objects are similar. It is sometimes used in [Recommendation systems](https://en.wikipedia.org/wiki/Recommendation_systems).

## Applications

Applications for machine learning include:

* [Adaptive websites](https://en.wikipedia.org/wiki/Adaptive_website)
* [Affective computing](https://en.wikipedia.org/wiki/Affective_computing)
* [Bioinformatics](https://en.wikipedia.org/wiki/Bioinformatics)
* [Brain-machine interfaces](https://en.wikipedia.org/wiki/Brain-machine_interfaces)
* [Cheminformatics](https://en.wikipedia.org/wiki/Cheminformatics)
* Classifying [DNA sequences](https://en.wikipedia.org/wiki/DNA_sequence)
* [Computational anatomy](https://en.wikipedia.org/wiki/Computational_anatomy)
* [Computer vision](https://en.wikipedia.org/wiki/Computer_vision), including [object recognition](https://en.wikipedia.org/wiki/Object_recognition)
* Detecting [credit card fraud](https://en.wikipedia.org/wiki/Credit_card_fraud)
* [Game playing](https://en.wikipedia.org/wiki/Strategy_game)
* [Information retrieval](https://en.wikipedia.org/wiki/Information_retrieval)
* [Internet fraud](https://en.wikipedia.org/wiki/Internet_fraud) detection
* [Marketing](https://en.wikipedia.org/wiki/Marketing)
* [Machine learning control](https://en.wikipedia.org/wiki/Machine_learning_control)
* [Machine perception](https://en.wikipedia.org/wiki/Machine_perception)
* [Medical diagnosis](https://en.wikipedia.org/wiki/Diagnosis_(artificial_intelligence))
* [Economics](https://en.wikipedia.org/wiki/Economics)
* [Natural language processing](https://en.wikipedia.org/wiki/Natural_language_processing)
* [Natural language understanding](https://en.wikipedia.org/wiki/Natural_language_understanding)
* [Optimization](https://en.wikipedia.org/wiki/Mathematical_optimization) and [metaheuristic](https://en.wikipedia.org/wiki/Metaheuristic)
* [Online advertising](https://en.wikipedia.org/wiki/Online_advertising)
* [Recommender systems](https://en.wikipedia.org/wiki/Recommender_system)
* [Robot locomotion](https://en.wikipedia.org/wiki/Robot_locomotion)
* [Search engines](https://en.wikipedia.org/wiki/Search_engines)
* [Sentiment analysis](https://en.wikipedia.org/wiki/Sentiment_analysis) (or opinion mining)
* [Sequence mining](https://en.wikipedia.org/wiki/Sequence_mining)
* [Software engineering](https://en.wikipedia.org/wiki/Software_engineering)
* [Speech](https://en.wikipedia.org/wiki/Speech_recognition) and [handwriting recognition](https://en.wikipedia.org/wiki/Handwriting_recognition)
* [Financial market](https://en.wikipedia.org/wiki/Financial_market) analysis
* [Structural health monitoring](https://en.wikipedia.org/wiki/Structural_health_monitoring)

**WEB AUTOMATION**

Scrapping Website and copying all necessary Xpath

Fixing the Semester number and iterating the roll number

Downloading Captcha for every roll number

Predicating Captcha using the saved machine learning dataset

Clicking on “view result” using Xpath

Fetching required field out of result table (i.e. Name, CGPA etc)

Storing the extracted content in a .txt file

**DATA VISUALIZATION**

Converting the saved text file into Dataframe

Pre-process the Dataframe

Creating and saving pie chart of pass vs. fail students

Creating and saving bar graph of ranks of students (according to SGPA)

Creating and saving bar graph of ranks of students (according to CGPA)

**ADVANTAGES**

1) Time saving.

2) Superfast when it comes to prediction.

3) Amazing future scope.

4) Makes the search easy.

**DISADVANTAGES**

1) Low Accuracy.

2) Need high RAM for processing.

3) Difficult to distinguish letters like I, J and 1.

4) Cannot distinguish and predict the joint letters.

5) Need large storage.

**DIFFICULTIES FACED**

1) Low computer configuration making work slower.

2) Too many wrong approaches.

-In our first approach we added all horizontal pixel of a (20x20) image making single label and only 20 features for a huge dataset.

-In our second approach we enormously increased no. Of feature resizing image of (500x500) pixel and having sum of its horizontal pixel. Still the Machine learning algorithm was unable to predict the letters accurately.

3) As machine learning being an emerging field, there were very less document regarding the machine learning.

4) Learning Machine learning without guidance was a tuff task.

5) Choosing a proper machine learning algorithm was a tuff task.

-Every time we have to train and test different algorithm it took almost 10-30 minutes.

-At first we tried KNN (K-nearest neighbour) approach which was not at all a success for a huge labelled dataset

-Training SVM (support vector machine) with different gamma and C-parameter was a time consuming.

**APPLICATIONS**

1) Useful for hackers to initiate DDos attack and create multiple ID on a single click.

2) It is very useful to perform sentimental analysis on a Hardcopy of a provided document.

3) With the help of OCR, people no longer need to manually retype important documents when entering them into electronic databases. Instead, OCR extracts relevant information and enters it automatically. The result is accurate, efficient information processing in less time.

4) Banking

The uses of OCR vary across different fields. One widely known OCR application is in banking, where OCR is used to process checks without human involvement. A check can be inserted into a machine, the writing on it is scanned instantly, and the correct amount of money is transferred. This technology has nearly been perfected for printed checks, and is fairly accurate for handwritten checks as well, though it occasionally requires manual confirmation. Overall, this reduces wait times in many banks.

**5) Legal**

In the legal industry, there has also been a significant movement to digitize paper documents. In order to save space and eliminate the need to sift through boxes of paper files, documents are being scanned and entered into computer databases. OCR further simplifies the process by making documents text-searchable, so that they are easier to locate and work with once in the database. Legal professionals now have fast, easy access to a huge library of documents in electronic format, which they can find simply by typing in a few keywords.

## 6) Healthcare

## Healthcare has also seen an increase in the use of OCR technology to process paperwork. Healthcare professionals always have to deal with large volumes of forms for each patient, including insurance forms as well as general health forms. To keep up with all of this information, it is useful to input relevant data into an electronic database that can be accessed as necessary. Form processing tools, powered by OCR, are able to extract information from forms and put it into databases, so that every patient's data is promptly recorded. As a result, healthcare providers can focus on delivering the best possible service to every patient.

**EXTRACTED RAW INFORMATION**

Name Roll No. Branch Status SGPA CGPA

AAYUSH BHARGAVA0812EI141001 EI PASS 7.13 6.69

ABHISHEK SINGH 0812EI141004EC PASS 7.38 7.10

ANADI MAHAJAN 0812EI141008 EI PASS 6.50 6.30

ANJALI DUBEY 0812EI141010 EX PASS 7.06 7.20

BOBBY PAL 0812EI141014 EI PASS WITH GRACE 6.506.36

CHURCHILL GUPTA 0812EI141016 EI PASS 7.56 6.86

EESHAN AHMED 0812EI141018 EI PASS 6.63 6.25

FAROOQ A. KHAN 0812EI141019 EI PASS 6.69 6.51

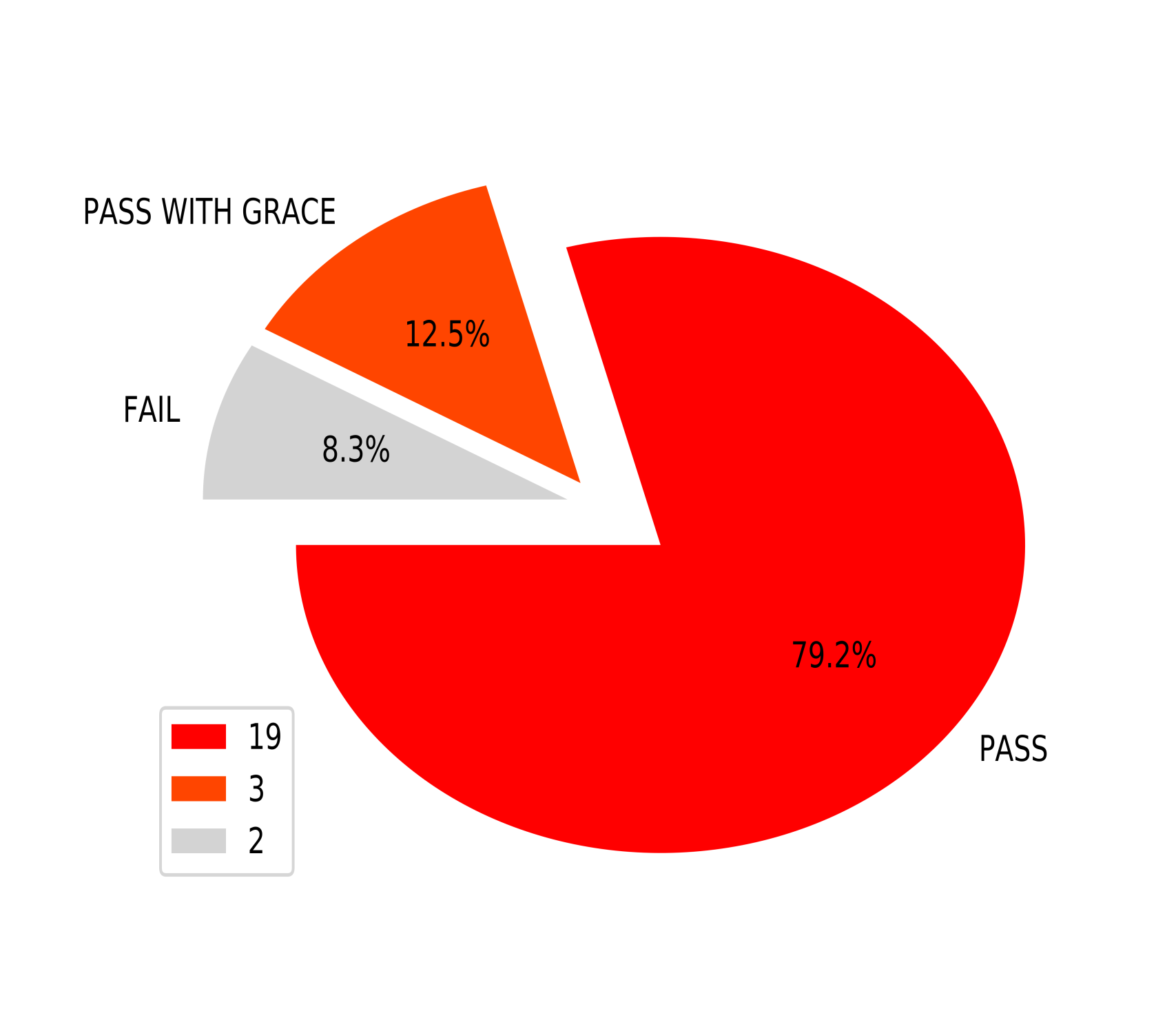
GOURAV KUMAR DANGE 0812EI141020 EI PASS 7.19 6.74

ITISHA SHRIVASTAVA 0812EI141022 IT PASS 8.19 7.78

KARTIK MUNGOLE 0812EI141024 EI PASS 8.06 7.53

MAYANK KOSHTI 0812EI141026 EI Fail in EI503 5.505.68

PRADEEP KOUSHAL 0812EI141031 EI PASS 7.56 6.42

**PIE CHART**

DECLARATION

**Declaration**

**DECLARATION (WITH SIGNATURE OF STUDENTS)**