

Fish Recognition Using Machine Learning Techniques

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ABSTRACT: These days the most significant viewpoint in Fisheries is the classification of Fish. Because of Segmentation issues, commotion and changes in the ecological circumstances, it is challenging to classify the Images with great precision. In any case, the object recognition with more noteworthy precision is in perfect request. Thus, to tackle this issue, the Convolutional Neural Network is utilized which assists to classify and localize the images with better exactness. Fish classification is made by training the dataset and the degree of precision has been improved by utilizing different activation functions. A few examinations have been made lastly a superior strategy has been distinguished, in this manner the exactness is moved along. Localization assists with producing Region proposition and class labels effectively. At last, image classification and localization has been made with more prominent precision.

I. INTRODUCTION

As of lately, a ton of review has been made in Recognition and Classification of an image. It turns into a moving undertaking because of elements like division mistakes, bending, clamor, covering of pictures, etc. Deep learning is one of the AI methods which assists the machine with thinking and behave like human in view of preparation phases. It assists a computer model to straightforwardly perform classification from text, picture, sound, video, etc. It assists with accomplishing an elevated degree of exactness and furthermore builds the performance level. Deep learning has a few strategies, for example, Deep neural network, Convolutional deep neural networks, Deep belief network, Recurrent neural network lastly Boltzmann machines. The most normally utilized Deep learning procedures are the

Deep neural network that is an Artificial neural network and the other one is the Convolutional neural network. Among them, the convolutional neural network has more advantages when contrasted and Artificial neural network. A Deep belief network, which is a class of deep neural network which contains a few layers of idle factors in the hidden unit. The principal task is to characterize fish with an elevated degree of exactness.

II. RELATED WORKS

[1]. In this paper they proposed in this paper Submerged autonomous vehicle ROV, AUV are used to get lowered species pictures. Gathering fishes from the lowered species pictures are huge for the regions where standard fishing gear can't test successfully. Likewise, ordering the picture information for a huge locale with the assistance of fisheries is beyond the realm of possibilities. Likewise, conventional fish acknowledgment process calls for a great deal of investment to characterize and count fish. In this way, robotized fish acknowledgment is expected to decrease idleness in fish order and then some. Other than these, fish species verifiable and quality control, assessment of fish people, fish incorporate extraction, concluding physical and social attributes of fish, matching model and structure are also purposes for the mechanized fish acknowledgment [2]. In this paper research proposed a strategy There are various sorts of fishes that are exists on the planet. However a couple of fishes are organization still not been finished. Comparative gathering the fishes is drawn-out and require work for tremendous number of fishes. Affirmation of fishes and picture is a norm use of PC vision innovation. It is normally see fishes and can disperse fishes with the help of

computerized development. and save time, labor supply also, makes task more direct. This paper shows low layered feature based fish picture gathering. Anyway fish revelation enjoys different benefits and demands, there are a couple of hardships to execute this. These difficulties integrate the clamor, impediment, cross-over, bending, division blunders in hued fish pictures. Previously presenting robotized fish location, ocean life researchers are utilized recognize fishes by distinguishing meristics, morphometrics, scale morphology and so on. [3] A few strategies are exists for ordering fish pictures. The majority of the performs with low accuracy. Also raw data is in like manner varies. The prefer structure in this paper considers two particular datasets. The framework consolidates worldwide element (Gist) and neighborhood include (GLCM). HeadPart Analysis (PCA), Discriminant Function Analysis (DFA), request tree are the quantifiable mechanical assemblies of plan which have been used. [4]. In their proposed model, introduced two regulated machine learning strategies which assists with identifying and perceive polyps fishes normally which are in lowered. The underlying move toward ordinary two stage technique which helps with isolating the Head On Generation components are utilizations in SVM classifiers. The resulting technique relies upon significant learning. They focused on post and pre-dealing with fishes. [5] In this paper they proposed and fostered a fish acknowledgment framework in light of shape and surface. They looked at ANN and EDM method are managing a testing of 300 pictures and a training set of 600 pictures. They are accomplished a precision of 81.67% and 99.00% with ANN and EDM individually arrangement of fish species. [6]. In this they proposed the calculation to recognize the fish naturally from the caught submerged recordings and furthermore a semiautomated strategy is proposed for sea and waterway energy gadget natural checking. This computerized cycle has diminished the work time and cost when contrasted with other checking strategies. Three different foundation replacement strategies are additionally utilized for the foundation deduction from the dataset regardless of whether the video quality is poor. [7] In this paper they made their examination in testing issues because of commotion, bending, division blunders, cross-over, impediment of protests, etc. This paper meant to distinguish a disengaged design in picture with the blend of vigorous element extraction. At long last, a grouping for the acknowledgment of a fish picture is grown effectively with separated highlights. Classifier orders the fish have two

classes, for example, poisonous and not harmful class. [8] In is paper for extricating genuinely the way of behaving with fishes and with out purifying the huge informational index. This strategy utilizes the profound learning and grouping calculation for eliminating the emerging exceptions (commotions) from bogus identifications and wrong directions task. The result of the temperature goes high, the speed of the fish is moreover extended.

III. IMPLEMENTATION

Tools

The fundamental execution has been finished in the model advancement style. At each stage, a model is worked for required issue and it is fabricated and tried for test inputs in the event that the model gives the right result, this model is implanted with the framework alongside legitimate connection points incorporated into it.

Python

Python is a center individual, evident level, by and large supportive programming language. Made by Guido van Rossum and first conveyed in 1991, Python's course of action speculation features code understandability with its obvious use of enormous whitespace. Its language creates and article coordinated approach expects to assist software engineers with clarifying, shrewd code for near nothing and epic degree projects.

Python is powerfully framed and trash collected. It keeps up with various programming rules, including procedural, object-organized, and utilitarian programming. Python is a significant part of the time depicted as a "batteries included" language because of its expansive standard library.

Features of Python

Python is an apparent level, deciphered, savvy and article organized planning language. Python is supposed to be amazingly comprehensible. It utilizes English watchwords regularly where as different tongues use feature, and it has less phonetic enhancements than different languages.

- Python is Interpreted – Python is dealt with at runtime by the judge. Gathering your program prior to executing it isn't required. This is like PERL and PHP.
- Python is Interactive – you can really sit at a Python brief and connection point with the center individual plainly to make your endeavors.
- Python is Object-Oriented – Python keeps up with Object-Oriented style or philosophy of programming that epitomizes code inside objects.
- Python is a Beginner's Language – Python is a stunning language for the young

person programmers and supports the improvement of numerous applications from clear text taking Tensor Flow

Tensor Flow is a free and open source programming library for dataflow and differentiable source programming across an extent of endeavors. It is a meaningful mathematical library, and is similarly used for AI applications like cerebrum associations. It tends to be used for both assessment as well as creation at Google.

Tensor Flow was been made by the Google Brain bunch for the internal Google use. It was conveyed under the Apache License 2.0 on November 9, 2015. Tensor Flow it is an open source programming library for the numerical estimation using data stream graphs. It was at first advanced was initially evolved by the Google Brain Team inside Google's Machine Intelligence research association for AI and profound brain networks research, yet the framework is sufficiently general to be material in a wide assortment of different spaces as well.6.1 Tools

The essential execution has been finished in the model improvement style. At each stage, a model is worked for required issue and it is constructed and tried for test inputs on the off chance that the model gives the right result, this model is inserted with the framework alongside legitimate connection points incorporated into it.

IV. METHODOLOGY

Pictures of nine distinct ocean depths types are gathered from the fish counter of a general store. Two cameras are utilized in the informational collection gathering process, a Kodak Easy offer Z650 and a Samsung ST60 with spatial goals of 2832X2128 and 1024X768 pixels, separately. While 50 particular fish pictures are gathered per every one of seven classes as follows: red mullet, plated head bream, horse mackerel, ocean bass, red ocean bream, dark ocean sprat and striped red mullet, 30 unmistakable pictures are caught for trout and shrimp. All fish in the picture securing process are new, and they are situated in different removals and points lighting conditions don't change altogether. In conclusion, rather than a perfect white foundation, a blue and boisterous foundation is liked to make the informational collection us a bleineated studies with genuine issues.

care of to WWW projects to games.



Figure 4.1: Example images from the collected dataset

Model pictures from the gathered informational collection are delineated in Fig. 4.1.

Besides, the example pictures of each of the nine classes are resized to 590 445 pixels by almost saving their angle proportion. Then, at that point, these examples are gone through an increase calculation where each picture is pivoted with non-rehashed arbitrary points and they are reflected. For every fish type, 1000 pictures are at last gotten for the development of the information set. Several tests are completed to dissect the presentation of the gathered information set. The fundamental method depends on fish division and afterward highlight put together fish classification (relying with respect to various element types) utilizing CNN based classifiers

4.1 K means Algorithm

The K-implies bunching calculation registers centroids and rehashes until the ideal centroid is found. It is hypothetically known the number of groups that are right there. It is otherwise called the level bunching calculation. The amount of bundles found from data by the system is implied by the letter 'K' in K-suggests. In this strategy, data centers are given out to bundles in such a way that how much the squared distances between the snippets of data and the centroid is fundamentally basically as little as possible. It is fundamental for note that decreased variety inside bunches prompts more indistinguishable information focuses inside a similar group.

Working of K means Algorithm:

The accompanying stages will assist us with understanding how K-Means bunching procedure functions.

- Step 1: First, we really want to give the quantity of groups, K, that should be created by this calculation.
- Stage 2: Next, pick K data of interest

indiscriminately and relegate each to a bunch. Momentarily, classify the information in view of the quantity of data of interest.

- Stage 3: The bunch centroids will currently be processed.
- Stage 4: Iterate the means beneath until we find the ideal centroid, which is the appointing information focuses to groups that don't fluctuate.
- 4.1 The amount of squared distances between

pieces of information and centroids would be determined first.

- 4.2 At this point, we really want to allot every information highlight the group that is nearest to the others (centroid).
- 4.3 Finally, figure the centroids for the bunches by averaging the entirety of the group's data of interest

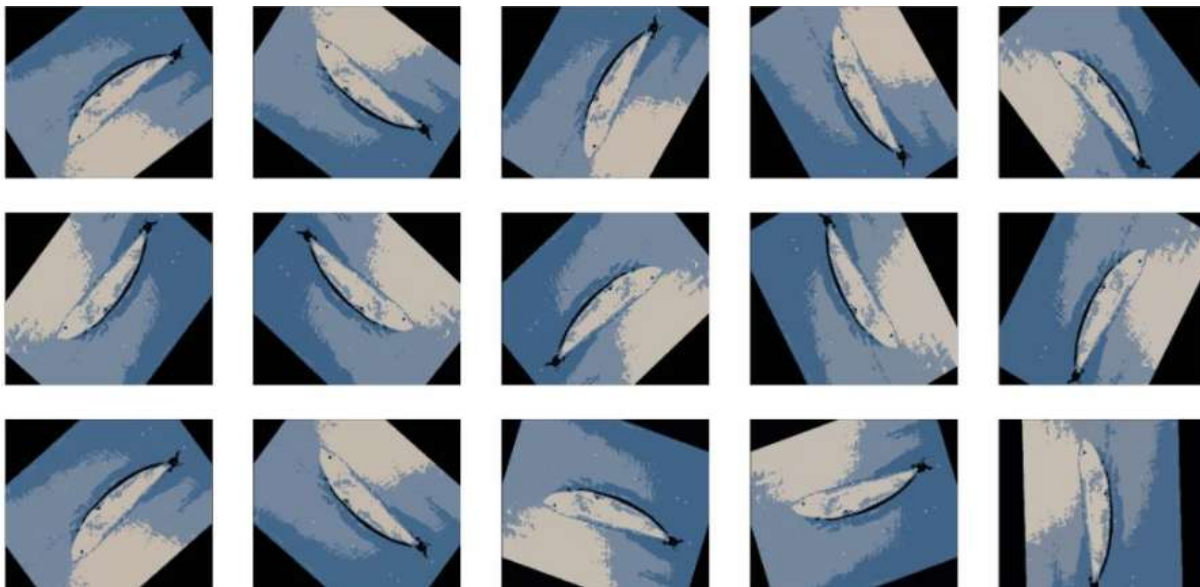


Figure 3.2: shows the results of k-Means Clustering

Median filter and Canny Edge Detection

The Median channel is a nonlinear mechanized isolating technique, habitually used to dispense with clamor. Such sound diminishing is a common pre-taking care of push toward work on the outcomes of later handling (for case, edge acknowledgment on a picture). Middle isolating is extensively used in cutting edge picture taking care of considering the way that under specific circumstances, it jam edges while killing upheaval. The primary thought of the middle channel is to show through the sign section to passage, supplanting each passage with the middle of adjoining sections. Note that assuming the window has an odd number of passages, then, at that point, the middle is easy to characterize: it is only the center worth after every one of the sections in the window are arranged mathematically. For a considerably number of passages, there is more than one potential middle. The middle channel is a powerful channel. Middle channels are generally utilized as smoothers for picture handling, as well as in signal cycle and time series handling. Shrewd edge recognition is a method to separate valuable underlying data from

different vision objects and decisively lessen how much information to be handled. It has been broadly applied in different PC vision frameworks. Vigilant has tracked down that the necessities for the utilization of edge identification on different vision frameworks are moderately comparative. In this manner, an edge discovery answer to address these prerequisites can be executed in an extensive variety of circumstances. The overall standards for edge discovery include:

1. Area of edge with low botch rate, and that suggests that the acknowledgment should unequivocally get anyway many edges shown in the image as could sensibly be anticipated
2. The edge point recognized from the chairman should unequivocally keep on the point of convergence of the edge.
3. A given edge in the picture ought to just be checked once, and where conceivable, picture unsettling influence shouldn't make misleading edges. To satisfy these requirements Canny used the math of assortments - a strategy which finds the capacity which upgrades a given utilitarian. The ideal capacity in Canny's identifier is depicted by how much four extraordinary terms, yet it will in

general be approximated by the first subordinate of a Gaussian. Among the edge disclosure procedures grew up until this point, Canny edge ID estimation is maybe of the most thoroughly described strategy that gives perfect and strong area. Inferable from its optimality to meet with the three models for edge ID and the straightforwardness of cooperation for the execution, it became one of the most renowned estimations for edge acknowledgment. The course of Canny edge acknowledgment computation can be isolated to five unmistakable advances:

1. Apply Gaussian channel to smooth the image to dispense with the upheaval
2. Find the power inclines of the image
3. Apply point size thresholding or lower bound cut off camouflage to get liberated of misleading response to edge acknowledgment
4. Apply two fold cutoff to choose anticipated edges.
5. Track edge by hysteresis: Finalize the area of edges by smptthering the extensive variety of different edges that are weak and not related solid for with.

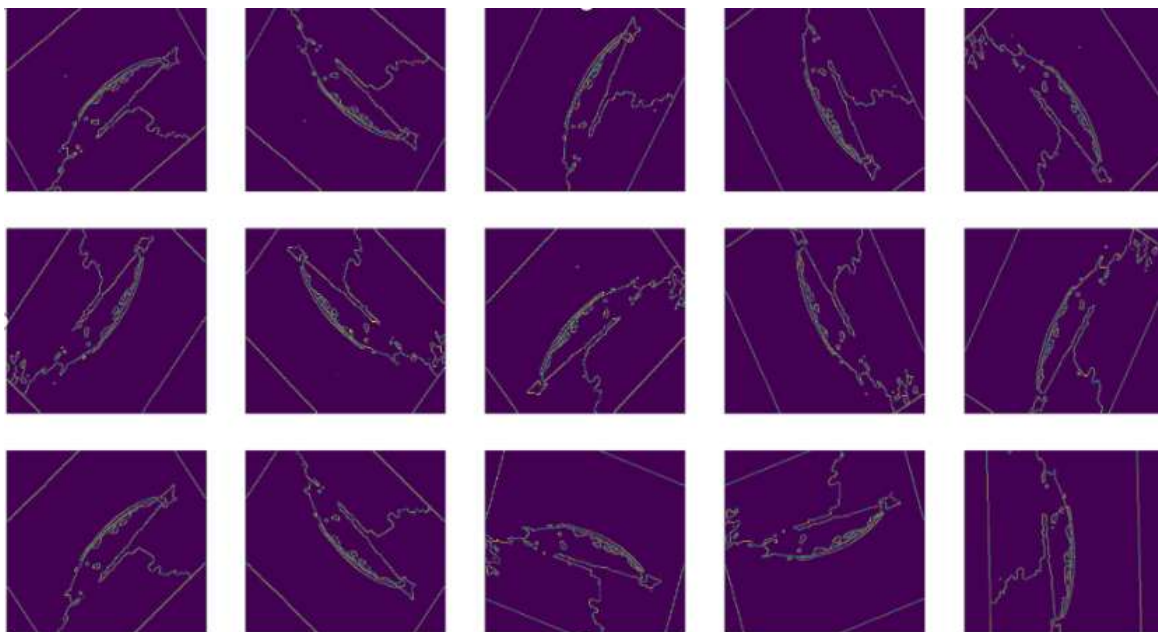


Figure : shows the results of Canny Edge Detection

Dividing fish into Blocks

1. Pursue the image.
2. Picture are partitioned into sub-blocks to the size $M \times N$.
3. For each sub block, standard still up in the air to grow force of picture object.
4. Worldwide limit is applied for each sub block which has standard deviation as more noticeable than one.

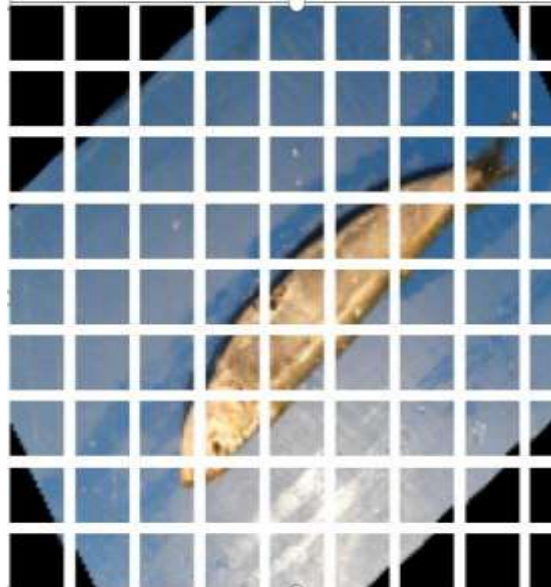


Figure 6.4 : Shows the fish image into blocks

Thinking back on this venture, the general result of results to be noticed. This can be assessed by seeing how well our goals were met. Our most memorable goal is to control the motor valve of a motor, select a direct actuator that meets particulars, and build an electronic control framework, manage the plan part of our task and were all practically accomplished. All the more explicitly, next evenhanded, the electronic control framework we built can peruse motor paces from 0 to 3600 rpm and change the valve timing relying upon motor speed and administrator inputs. Be that as it may, our last goal, to acquire gains in strength, force, and proficiency of 2% was not met on account of not setting up in a motor but rather hypothetically it ought to be finished. We are certain however that this target of introducing in a motor can be met assuming additional opportunity for testing and offices is given. There is a ton we could say regarding the requirement for variable valve timing. This plan is exceptionally practical for the fate of the car business as well as our schooling.

V. TESTING AND DESIGN

Testing is the most widely recognized approach to surveying a system and parts with the reason to view that as whether or not it satisfies the particular prerequisite. This development achieves real, expected and the difference between their results. In essential words testing is executing a system to recognize any openings, botches or missing requirements contrary to the certifiable desire or necessities. As per the ANSI/IEEE 1059 standard, Testing can be portrayed as "A course of breaking

down a product thing to distinguish the distinctions among existing and required conditions and to assess the elements of the product things". Testing is the demonstration of settling on genuine choices with deference to the degree to which the system (contraption) meets, outperforms or forgets to meet communicated objectives.

VI. FRAMEWORK DESIGN AND ANALYSIS

System Analysis

The most common way of concentrating on a methodology to recognize its goals and purposes and make structures and frameworks that will achieve them in a useful way. Another way to sees framework examination as a critical thinking method they separates a framework into its part pieces with the ultimate objective of the concentrating on the well know part to parts work and interface to goal their motivation. The field of framework investigation relates near necessities examination or to tasks research. It is likewise an unequivocal proper request did to assist a leader with recognizing a superior game-plan and pursue a preferred choice over she could somehow have made.

System Design

Structures arrangement is the most widely recognized approach to describing the design, modules, marks of collaboration, and data for a structure not set in stone prerequisites. Frameworks setup ought to have been noticeable as the usage of systems speculation to thing progression. There are some cross-over with some disciplines of systems

examination, structures plan and structures planning.

The Purpose of this plan report is to investigate the coherent perspective on engineering plan, information stream graphs, grouping outline and an outline of the proposed framework for playing out the activities, for example, signature catching, pre-handling, include extraction and approval which when consolidated to give the ideal result.

VII. System Architecture

Design centers around review of a framework as a mix of different various parts and how they interface with one another to deliver the ideal outcomes. The attention is on recognizing the parts or sub-frameworks and how they are

interconnected. A design is the sensible model that portrays the construction, lead and more viewpoints on the system. An engineering portrayal is a regular depiction and depiction of a system, composed with the end goal that supports contemplating the plans and direct of structure.

In the significant level design of the proposed framework, it is addressing the client association the framework. At first the framework takes input document. Then, at that point, all the handling is completed inside the framework. The framework is answerable for handling framework which is then pre-handled, then, at that point, trailed by CNN model. Likewise, highlights are extricated, the framework is prepared to group the fishes. At last, wanted yield is acquired.

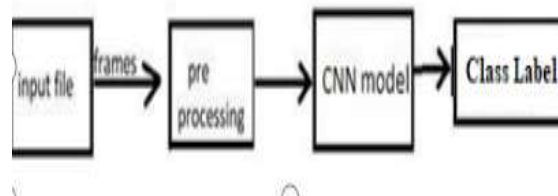


Figure: System architecture

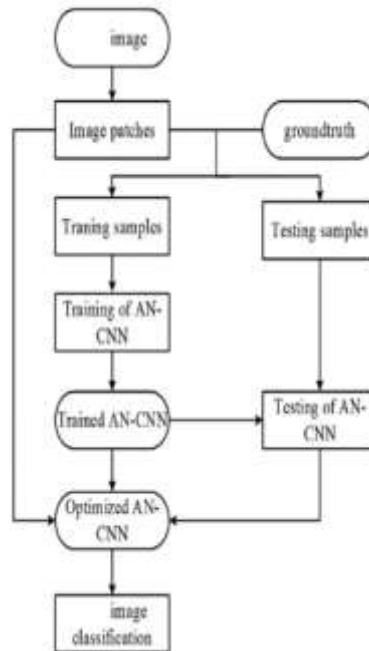


Fig Flow Diagram

TEST CASE ID	TEST CASE NAME	TEST CASE DESCRIPTION	TEST STEPS			TEST STATUS	
			STEPS	INPUT GIVEN	EXPECTED OUTPUT		ACTUAL OUTPUT
01	Given an Input	Providing an input as image and check if it is accepted	Click the button and browse and click an image to be input	Ce.mp4	File format unsupported	File format unsupported	Pass
02	Giving input	Providing an input as image and check if it is accepted	Click the button and browse and click an Image to be input	Ce.jpg	Accepted and further processed	Accepted and further processed	Pass
03	Giving inputs symbols For Threshold	Alphabets, Symbols Non-Symbols	Type the input symbol	Symbols	Not Accepted	Not accepted	Pass
04	Giving inputs symbols For Threshold	Alphabets, Symbols Non-Symbols	Type the input symbol	Symbols	Not Accepted	Not accepted	Pass
05	Input image for Fish detection	Providing an input as image and check if it is accepted	Click the button and browse and click an image to be input	Fish.jpg	Accepted and further processed	Accepted and further processed	Pass

TABLE :TEST CASES

VII. RESULTS AND DISCUSSION

The armature of our model of FC is presented. There are a few inclinations for practicing convolutional brain networks among regular systems. Weight partaking in convolutional layers will drop the quantity of boundaries and make it simpler to descry bright traits, comparative as edges, corners. The utilization of a pooling subcaste will resolve the given issue of perceptivity between the undertaking highlights connive and the info highlights ' position, consequently outfitting invariance to changes in the removed elements ' endlessly position. The cluster standardization subcaste is utilized to make a profound organization preparing strong by diminishing inward covariate shift and more steady. The proposed model comprises of a progression of way-

The first subcaste input conveys the picture of size $224 \times 224 \times 3$ and moves into the first convolutional subcaste having 32 point graphs. - After going through anon-direct enactment capability(ReLU) and group standardization, going through a greatest pooling subcaste. Consequently,

the picture limits been $28 \times 28 \times 128$. - The substitute convolutional subcaste conveys the previous subcaste's undertaking as contribution with 64 point graphs. It's likewise moving into anon-linearity capability(ReLU), bunch standardization, and furthermore a most extreme pooling subcaste, so the undertaking is currently decreased to $56 \times 56 \times 64$. - The third convolutional subcaste has 128 point graphs, moving into anon-straight enactment capability(ReLU) and group standardization, going through the most extreme pooling subcaste. Subsequently, the picture limits been $28 \times 28 \times 128$. - The fourth convolutional subcaste has 256 point diagrams, moving into anon-direct enactment capability(ReLU) and clump standardization, likewise moving into a greatest pooling subcaste. Consequently, the picture limits been $14 \times 14 \times 256$. It's beneficial to take note of that for convolutional layers 1 to 4, the size of every bit was 3×3 with a step of 1. As well as, the muck size of the most extreme pooling layers was 2×2 with a step of 2.

The fifth to seventh convolutional layers are associated one after the other. These convolutional layers utilized 512, 265, 128 point outlines, autonomously, followed by non-linearity capability (ReLU), batch standardization, and furthermore greatest pooling subcaste. It's beneficial to take note of that for convolutional layers 5 to 7, the size of every piece was 5×5 with a step of 1. As well as, the muck size of the greatest pooling layers was 2×2 with a step of 2. - The eighth convolutional subcaste having 64 point outlines, and the size of every portion is 7×7 with a step of 1. Subsequent to moving into a nonlinear enactment capability (ReLU), the convolutional subcaste's undertaking is smoothed through a totally associated subcaste with 576 point outlines. likewise it's associated again to a totally associated subcaste with 128 units. - likewise, going through the Dropout subcaste with 0.3 is associated again to a totally associated subcaste with 256 units. The softmax subcaste is utilized for the undertaking subcaste with eight units that adjust to the quantity of classes in the dataset.

In this preliminary, we separated the dataset for preparing 70 and testing 30, which had a place with nine classes. The testing is utilized as affirmation information to approve our model; in this manner, the last time aftereffect of the affirmation delicacy is utilized as test delicacy. additionally, we played out the investigation on five enhancers. The typical exhibition results were accomplished on 10 ages. For this preliminary, the best analyzer is imagenet which accomplished 97 testing delicacy.

In this plan, the figure 1 shows the Input fish dataset of 9 classes. The info pictures are preprocessed utilizing Keras Preprocessing. First Phase of the Project is implemented utilizing ANN calculation, the detail clarification is give in the previous area, The consequence of ANN classifier is displayed in Figure 2 with the most extreme delicacy 90. Substitute Phase of the Project is implemented utilizing ANN calculation, the detail clarification is give in the previous area, The consequence of ANN classifier is displayed in Figure 3 with the most extreme delicacy 95. To deliver the interest of the plan, third Phase of the Project is upheld utilizing move proficiency calculation called imagenet, the detail clarification is give in the previous area, The aftereffect of move education classifier is displayed in Figure 4 with the most extreme delicacy 97. In the end we analyze the aftereffects of every one of the three classifiers.

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