**A Synopsis on**

**“Indian Food Image Classification with Transfer Learning”**



**Department of Information Technology**

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**Abstract**

The manually work is the these people have to get knowledge or information from different kind of sources like books, people, etc. But these is very difficult to find out answers for queries of about their issues. So from this food Recipe Management System project we are giving ultimate solution for all of them that is we are making application where each and every user can give input as image of food. And out system will show the recipe of the food. These application have username and password. For security purpose. and our application is contain about all the food items with irrespect of the region or country. so our application is open for any one with irrespect of country and region. To resolve the issues of the previous things we are not  providing any restriction for the user to see application.

**Keywords:** Convolutional neural network, Google inception v3 model, VGG16, VGG19, ResNet, Transfer learning, Food classification Introduction.

**Introduction**

Training of CNN for image classification can be done mainly in 2 ways: training the CNN from the scratch or using the concept of transfer learning. Transfer learning is a deep learning technique where a model is trained to learn and store the knowledge from one problem and use the same model to other similar problems. i.e., fine tuning already trained CNN models from the huge dataset to food image classification task. The Pre-trained models used are Inception V3 [1], VGG16 [2], VGG19 and ResNet. These are the top performing models in the annual Imagenet large scale visual Recognition challenge (ISLVRC) [5] giving considerable accuracy and less validation loss.

Through this research an effort has been put to classify Indian food images into their respective classes using transfer learning. Image Classification with deep learning techniques such as Convolution neural network are getting incredible consideration because of their efficiency in learning and classifying complex features. A comparison has been made between the models with respect to accuracy and validation loss.

Statistics show that 95% of the people do not follow any nutritional plan as these are very strict and restricts people from consuming their day-to-day food. Old aged who want to monitor their food intake, patients who want to monitor their health through food due to different dietary restrictions and mainly youth who want to track the calories and nutrition intake to maintain fitness, the importance of food classification has increased. Over the past couple of years, image based dietary and calories extraction has been a challenging task and a lot of research is going on the same.

**Literature Survey**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sr. No.** | **Title &year** | **Author** | **Description** | **Advantage** |
| 1. | Food Classification from Images Using Convolutional Neural Networks  (2017) | David J. Attokaren, Ian G. Fernandes, A. Sriram, Y.V. Srinivasa Murthy, and Shashidhar G. Koolagudi | In this paper, The process of identifying food items from an image is quite an interesting field with various applications. | Easy Identify Food Classificatin. |
| 2. | Deep Convolutional Generative Adversarial Network Based Food Recognition Using Partially Labeled Data  (2018 ) | Bappaditya Mandal , N. B. Puhan and Avijit Verma | In recent works, convolutional neural networks (CNN) have been applied to this task with better results than all previously reported methods.infrastructures. | Easy Identify Food Recognition. |
| 3. | Few-shot and Many-shot Fusion Learning in Mobile Visual Food Recognition  (2018) | Heng Zhao , Kim-Hui Yap , Alex C. Kot , Lingyu Duan , Ngai-Man Cheung | As a Result they are not amenable for deployment on mobile devices. In this paper, we address these issues by proposing a new few-shot and many-shot fusion learning for mobile visual food recognition, it has a compact framework and is able to learn from existing dataset categories, and also new food categories given only a few sample images. |  |

**Motivation:**

Understanding “why people eat what they eat” is important for improving the lives of people around the world by helping provide industrial and social solutions for people to have greater pleasure and health from the foods they choose.

**Objectives:**

* Our main goal of project is to find out Recipe by using Image Processing.
* Given input as image of food like( panner tikka, dum-biryani, alu mutter etc) give output of Food Recipe.
* With current development universally in computing, now a day’s user interaction approaches with mouse, keyboard, touch-pens etc. are not sufficient.

**Problem Statement:**

# The Indian Food Classification application is the application will be hosted. So a user or visitor can visit the application check for the recipes by using image processing.

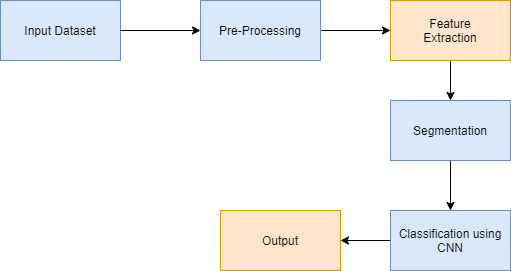
**Methodology:**

**1. Dataset :** Input as dataset of Model.

**2. Preprocessing :** A real-world data generally contains noises, missing values, and maybe in an unusable format which cannot be directly used for machine learning models. Data preprocessing is required tasks for cleaning the data and making it suitable for a machine learning model which also increases the accuracy and efficiency of a machine learning model.

**3. Feature Extraction :** Feature selection and feature extraction techniques are what all humans can do. However, for learning algorithms, it is a problem of feature extraction in machine learning and selecting some subset of input variables on which it will focus while ignoring all other input variables. In other words, it affects the Dimensionality Reduction of feature extraction algorithms.

**4. Classification :** Classification is a process of categorizing a given set of data into classes, It can be performed on both structured or unstructured data. The process starts with predicting the class of given data points. The classes are often referred to as target, label or categories.The classification predictive modeling is the task of approximating the mapping function from input variables to discrete output variables. The main goal is to identify which class/category the new data will fall into.

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**System Architecture**

**SOFTWARE AND HARDWARE REQUIREMENTS:**

**Software requirement:-**

|  |  |  |
| --- | --- | --- |
| **Sr.No.** | **Software Component** | **Details(Technical details with Purpose)** |
| 1 | Operating System | 64bit Windows 10 and on words |
| 2 | Technology | Python |
| 3 | IDE | Spyder |
| 4 | Database | DBSqlite |

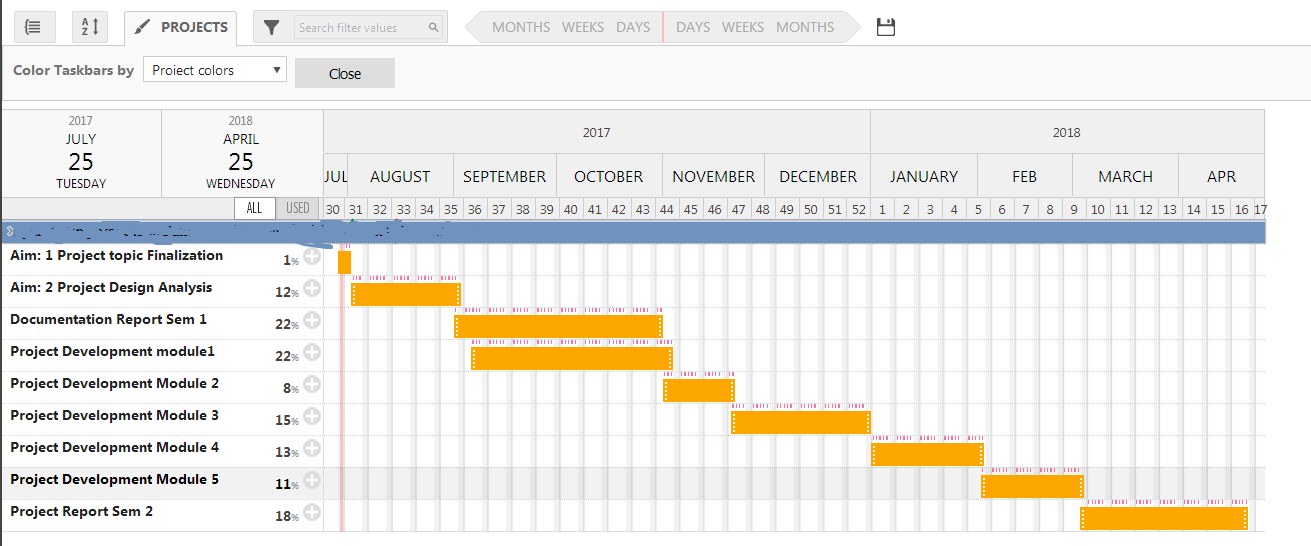
**Hardware requirement:-**

|  |  |  |
| --- | --- | --- |
| **Sr.No.** | **Component** | **Details(Technical details with Purpose)** |
| 1 | System Processor | Core2Duo |
| 2 | Hard Disk | 150GB |
| 3 | Speed | 2.4 GHz |

**Action Plan:**

|  |  |  |
| --- | --- | --- |
| **Work Task** | **Description** | **Duration** |
| Literature Search | Related work done for conceptual data similarity | 6 weeks |
| System analysis | Critical analysis and comparison of technologies studied and results achieved in research | 4 weeks |
| Design and Planning | Modeling and design and dataset searching or creation | 8 weeks |
| Implementation | Divided into phases |  |
| Phase A | Implementation module 1 | 2 weeks |
| Phase B | Implementation module 2 | 2 weeks |
| Phase C | Implementation module 3 | 3 weeks |
| Phase D | Implementation module 4 | 4 weeks |
| System Testing | Test system quality, fix errors if any and  improve if needed. Test system for differ-  ent datasets | 3 weeks |
| Intial Report | Prepare and upload Initial Report | 2 weeks |
| Final Report | Prepare and upload Initial Report | 2 weeks |

**Project Plan Execution:**

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**Applications:**

* Food Manufacturing Supply chain optimization – less waste and more transparency As long as food manufacturers are concerned with food safety regulations, they need to appear more transparent about the path of food in the supply chain.

**Conclusion**

In this research study, the Convolutional Neural Network, a Deep learning technique is used to classify the food images in to their respective classes. The dataset considered is the Indian food dataset and we were able to achieve accuracy of 87.9% in case of the inception V3 model compared to other models such as the VGG19 that produced 78.9%. The VGG16 model and the ResNet model were able to produce accuracy of 78.2% and 69.91% respectively.

**References:**

[1] David J. Attokaren, Ian G. Fernandes, A. Sriram, Y.V. Srinivasa Murthy, and Shashidhar G. Koolagudi, “Food Classification from Images Using Convolutional Neural Networks”, 2017.

[2] Bappaditya Mandal , N. B. Puhan and Avijit Verma, “Deep Convolutional Generative Adversarial Network Based Food Recognition Using Partially Labeled Data”, 2018.

[3] Heng Zhao , Kim-Hui Yap , Alex C. Kot , Lingyu Duan , Ngai-Man Cheung, “Few-shot and Many-shot Fusion Learning in Mobile Visual Food Recognition”, 2018.