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| Ex. No: 1 | **Problem statement, objectives.** |
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# Objective

Student will be able to identify the problem statement and provide objective/solution for the identified problem.

1. Title of the project

Agriculture automation using deep learning techniques Cloud based Mobile Application

1. Existing Solutions

Smart farming is a new concept that makes agriculture more efficient and effective by using advanced information technologies. The latest advancements in connectivity, automation, and artificial intelligence enable farmers better to monitor all procedures and apply precise treatments determined by machines with superhuman accuracy. Farmers, data scientists and engineers continue to work on techniques that allow optimizing the human labor required in farming. With valuable information resources improving day by day, smart farming turns into a learning system and becomes even smarter. Deep learning is a type of machine learning method, using artificial neural network principles. The main feature by which deep learning networks are distinguished from neural networks is their depth and that feature makes them capable of discovering latent structures within unlabeled, unstructured data. Deep learning networks that do not need human intervention while performing automatic feature extraction have a significant advantage over previous algorithms.

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| **S.NO** | **Article Name** | **Problem** | **Proposed Methods** | **Source of Data** | **Results and Advantages** |
| 1 | Deep count: fruit counting based on deep simulated learning | Estimation of tree, fruit, and flowers numbers for improving decision making | automatic yield estimation based on robotic agriculture a stimulated deep convolutional neural network for yield estimation | Synthetic and Real Data | In the study area-based counting, shallow networks were compared to deep networks Accuracies for are hard counting, shallow network and proposed method were 6 18%, 11.50% and 91 03% respectively The average time for one test image for manual counting is 6.5, for the proposed method is 0.006 |
| 2 | Automatic prediction of villagewise soil fertility for several nutrients in India using a wide range of regression methods | An automatic prediction of fertility indices | Fertility indices for soil nutrients such as magnese, zinc, iron, and phosphorus pentoxide were used in available regression methods | Data include 372 geo-referenced patterns | A collection of 76 repressors like Deep Learning, ANN, SVM, RF, quantile regression, partial least squares, generalized additive models bagging, and boosting were compared. The most accurate prediction of five nutrients and soil fertility indices was achieved by ExtraTrees. |
| 3 | Modeling spatio-temporal distribution of soil moisture by deep learning-based cellular automata model | Precise irrigation scheduling | A model using deep belief networks (DBN) for predicting the soil moisture content (SMC) was applied to an irrigated corn field | Data from 172 sensors | A multi-layer perceptron (MLP) was compared to DBN. Compared to the MLP-MCA model, the DBN-MCA model caused a reduction in RMSE by 18%. |
| **S.NO** | **Article Name** | **Problem** | **Proposed Methods** | **Source of Data** | **Results and Advantages** |
| 4 | Apple flower detection using deep convolutional networks | Estimate bloom intensity | A pre-trained convolutional neural network is improved for flower detction. | Dataset is composed of a total of 147 images | The proposed methos (CNN+SVM) was compared to the three baseline methods such as HSV, HSV+SVM, and HSV+Bh. It outperforms these approaches precision rates higher than 80% AUC-PR for HSV, HSV+Bh, HSV+ SVM, CNN+SVM are 54.9%, 61.6%, 92.9%, 97.7% respectively. |
| 5 | Deep learning for soil and crop segmentation from remotely sensed data | To correctly identify and separate crops from the soil | A strategy for integrating terrain height (DSM) images with radiometric index (NDVI) to segment crops and tree objects over the soil through use of high-resolution images from UAVs. | High resolution Digital Surface Model (DSM) data | The results demonstrate that the method potentially enables the correct segmentation of soil. It is shown the DSM/NDVI index produces an improvement of about four times compared to its baseline NDVI marker. |
| 6 | Maize silage kernel fragment estimation using deep learning based object recognition in non-separated kernel/stover RGB images | To determine the quality of harvested crop | Two deep learning methods adopted for kernel processing prediction without stover and kernels separation step before capturing images. | 1393 images containing just over 6907 manually annotated kernel instances | Bounding-box detection was performed with Region-based Fully Convolutional Network (R-FCN) and instance segmentation was performed with Multi-task Network Cascade (MNC). Kernel Processing Score (KPS) calculation become to be done in minutes by removing the requirement of kernel/stover separation. |
| **S.NO** | **Article Name** | **Problem** | **Proposed Methods** | **Source of Data** | **Results and Advantages** |
| 7 | Deep learning for plant identification using vein morphological pattern | Plant identification using vein morphology | A deep convolutional network was used to develop a task specific module | White Bean, Red Bean, and soybean leaves dataset | A feature extractor that learns relevant features automatically provides the estimation of manual search. The study shows that the depth of the model makes a positive effect on the final accuracy. |

1. Problem Statement

Agriculture automation using deep learning techniques

1. Project Objective

Making agricultural activities more economically efficient has always been one of the main objectives throughout human agrarian history. However, this objective has not been achieved to the desired level due to the difficulty in establishing quality/cost balance. To get quality products, agricultural production areas need to be visited frequently, thus, it may be possible to affect all necessary precautions during crop production. As farmers spend time and resources on each visit, they increase the cost of the crop. Smart agriculture has become necessary, given that farmers spend much of their time monitoring and evaluating their crops. ``Internet of things'' (IoT)-based technologies offer remote and precise monitoring, making managing crops not only smart but also cost-effective.

However, real-time monitoring of agricultural activities is not enough to make agriculture smart. Smart agriculture should follow the cycle of observation, diagnosis, decision, and action. In this continuously repeating cycle, data should be collected and used quickly to make changes that optimize the farming process. During the observation phase, data can be obtained and recorded using sensors capturing features from natural resources like crops, livestock, atmosphere, soils, water, and biodiversity. During the diagnostic phase, the sensor values are transmitted to a cloud hosted IoT platform based on predefined decision models that determine the state of the object under investigation. During the decision phase, the components based on machine learning techniques determine whether an action is required. During the action phase, the end-user evaluates the situation and applies the action. Then the cycle starts all over again. Here, the main objective of the project is to create a cloud-based mobile application which integrates AI, ML and DL to predict and classify the type of Plants, Fruits and Soil and an addition to Smart Irrigation. All these modules are integrated into an application which uses cloud resources to do the computation process.