**LITERATURE SURVEY**

**L. Ismail et al.(2018)**

Created a framework to predict preparedness of a country to face the climate change using machine learning approach. The study is done for South East Asia. Steps for calculating the predictive index are data acquisition, data training, data testing, index predicting, index validation and index visualization. The study is a precautionary measure to alert the regions and verify its vulnerable index using deep learning.

**Zhen Nan Liu, et al., (2018)**

In this paper, authors have compared different machine learning algorithms for calculating, standarlized precipitation Index (SPI) and SPEI. After data collection, Extreme learning methods, Online sequential extreme learning machine, Self adaptive evolutionary extreme learning machine. Authors claimed that all three algorithms can be applied successfully on drought forecasting. However, OS-ELM and SADE- ELM performs better than ELM.

**Cha Oyun Zhang, et al., (2018)**

Presented an ample survey of the crossovers between the two areas. A brief study of applications of networking using deep learning techniques is done. We then discuss several techniques and platforms that facilitate the efficient deployment of deep learning onto mobile systems. Authors focus on how can deep learning can be useful for mobile and wireless networking. This is a survey paper surfacing the issues and challenges in deep learning in wireless and mobile networks.

**K. G. Lia kos et al., (2018)**

Presented a comprehensive review of research dedicated to machine learning applications in agriculture domain. Various parameters on which work was analysis were: crop management, livestock management, water management and soil management. ML models have applied for crop yield prediction and disease detection. ML based detection can be extracted without the need of fusion of data from other resources. Author claims that farm management systems are into real artificial intelligent systems, with the ultimate scope of production improvement. Author motivates to use ML for the benefit of agriculture as it is the basic need amongst all other needs for survival.

**Crane Droesch (2018**)

Has used data on corn yield from the USMidwest, and shown that the approach of using semi-parametric variant of deep neural network, accounting for complex non-linear relationship in high dimensional dataset, the model will outperform both classical statistical methods and fully non-parametric neural networks in predicting yield of years withheld during model training. Authors have developed a novel approach for augmenting parametric statistical model with deep neural networks, they have termed it as semiparametric neural networks. It is used as a crop yield modelling framework, the SNN achieves better out of sample predictive performance than anything else yet published. it uses prior knowledge of functional phenomenon and functional form relating them to the outcome. So the SNN improves statistical efficiency over typical neural networks. They found that combining ML with domain area knowledge from empirical studies improves predictive skills, while altering conclusions about climate change impact to agriculture.

**P. Priya et al., (2018)**

Has proposed a random Forest Algorithm for predicting the crop yield of particular area considering various parameters such as rainfall, seasonal crop (Rabi and Kharif) district-wise, temperature (max.), crop production in terms of Kgs/tonnes. Area for doing research was Tamil Nadu. Dataset record were collected from Indian Government over 15years for rice production. They proved in experimental results that prediction analysis done using Random Forest Algorithm – a supervised machine learning algorithm will help farmer to predict the yield of the crop before cultivating onto the agricultural field. This algorithm run efficiently on large databases with high classification accuracy.

**N. Zhu, et al. (2018**)

This article summarizes DL algorithms, considering concepts, constraints, implementation, procedure of training, and sample codes, to aid researchers in agriculture to facilitate with DL techniques quickly. Research on DL applications in agriculture is summarized and analysed, and future opportunities are discussed in this paper, which is expected to help researchers in agriculture to better understand DL algorithms and learn major DL techniques quickly, and further to facilitate data analysis, enhance related research in agriculture, and thus promote DL applications effectively.

**S. Rasp, et al. (2018**),

Presents a different perspective to sub-grid parameterizations to a DDA that influences the benefits of high-resolution modelling. Challenges to overcome, but advances in computing capabilities and deep learning in recent years present novel opportunities that are just beginning to be investigated. Authors believe that machine-learning approaches have huge potential to be explored connection with development of traditional model.

**Jinyoung Rhee et al., (2018)**

Has targeted all officials whose main duties include water resources and agricultural management. The final beneficiaries of the output are residents of the area; water users and farmers for whom decision-making can be helped by drought prediction information with finer spatial resolution The models provide spatially distributed detailed drought prediction data of the 6-month Standardized Precipitation Index for the case study area, Fiji. They used Weather Research Forecasting (WRF) model as reference data for overcoming the limitations of non-dense monitoring network. Also they used Performance measures of the mean absolute error as well as classification accuracy. The WRF outputs reflect the topography of the area. Hybrid models showed better performance than simply bias corrected forecasts in most cases. The model based on Extra-Trees trained using the WRF model outputs performed the best in most cases.

**S. D. Patil et al., (2017)**

Suggests that according to their results, direct prediction of spectral band information is highly beneficial due to the ability it provides for deriving ecologically relevant products which can be used to analyse land cover change scenarios from multiple perspective. Aim of the authors, is to enhance the use of machine learning based land cover change models to predict the spectral band information of satellite based land cover images. Experimental areas covered by authors is some portion of United States. They used data from two large sites in US to train model RF machine learning model to spectral values from bands. They used the trained model to explore the look of land cover for a climate change scenario. The demonstrative results show that the direct prediction ofspectral band information is helpful for deriving ecological products. They have considered this as a major strength of their proposed approach as it has enabled the analysis of land cover change from multiple viewpoints The authors have made a comment through their literature survey, that in 2081-2100 projectedrise in temperature will be 1.5o – 4.8oC than 1986-2005 era. This will impact global landcover. timely and accurate prediction may provide useful solutions. Author has chosen RF model of ML in the study as it ensembles constitutes are comprised of DT models that offers variety of attractive features over other statistical learning techniques. Parameter selection was done based on their judgement of importance of factors. They urge research scholars to continue the work by analysing other predicted variables or modifying the data sources.

**Annelie Holzkamper (2017**)

Gives a systematic literature review in modelling for adaptation in planning in agricultural production systems. The author has studied five types of models namely empirical crop model, regional suitability model, Biophysical model, meta model, decision model. According to the author, the key challenge of adaptation plantation is the risk of maladaptation – adaptation that implies negative consequences in long term or in wide context. The five approaches differ in terms of their applicability for decision support in short term and long term adaptation planning. The main value lies in the ability to predict the climate change impact on yield potential at all level. For short term, reactive adaptation responses, statistical and biophysical models are less useful. Authors say adaptive management cycles should be institutionalised, within which adaptation behaviour, consequences of adaption responses and changes in impacts are continuously monitored.

**Dr. Pushpa Mohan et al, (2017)**

Has given analysis of the techniques employed and parameters achieved with limitation that every technique and experiment faced. This paper helps to have a crisp view of Regression Analysis, Linear regression by Sellam (2016). Limitations say that it is more complex to predict the optimized number of input parameters.

**Evan Racah et al., (2017)**

The authors have used deep learning for weather prediction and climate change. for this they have used. For calculating the extreme weather projection values, the labels for extreme weather events namely Tropical Depressions (TD) Tropical Cyclones (TC), Extra-Tropical Cyclones (ETC) and Atmospheric Rivers (AR) using TECA (Prabhat et al., 2012) are identified. 3D semi-supervised learning architecture is used. For experimentation, frame-wise reconstruction is done, Detection and localization and feature exploration is done.

**Zaki Ahmad Khan, et al., (2017)**

Suggests different machine learning strategies for Wireless Sensor Networks (WSN). It presents a brief idea about supervised and unsupervised learning and its respective types. The author has suggested machine learning solutions for some operational, functional issues such as - query processing and event recognition, Medium Access Control, routing in WSN, object targeting and localization, Clustering and Data collection. Some other challenges highlighted are non-operational and application-specific challenges to address the WSN challenges.

**Amir Ghaderi et al., (2017)**

Mainly contributed to obtain forecasts of all nodes of the graph at the same time based on one framework. They studied the results of a case study on recorded time series data from a collection of wind mills in the north-east of the U.S. and shown that the proposed DL-based forecasting algorithm significantly improves the short-term forecasts compared to a set of widely-used benchmarks models. They used LSTM and RNN for their work.

**Aized Amin Soofi et al., (2017)**

Classification is a data mining (machine learning) technique used to predict group membership for data instances. There are several classification techniques that can be used for classification purpose. Researchers use the basic classification techniques. Later usage of some major types of classification method including Bayesian networks, decision tree induction, k-nearest neighbour classifier and Support Vector Machines (SVM) with their strengths, weaknesses, potential applications and issues with their available solution had been applied. Their ultimate goal was to provide a comprehensive review of different classification techniques in machine learning. This provided platform for both academia and new comers in the field of machine learning to further strengthen the basis of classification methods.

**Donghyun Lee et al., (2017**)

Describes Artificial Intelligence and deep learning as a promising futuristic concept of technological advancements. Authors used deep learning’s recurrent neural network (RNN) model algorithms to predict pro-environmental consumption index based on Google search query data. Advanced research on ANN and RNN development processes is done. 84 different datasets were used by the author for verification of reliability of data by doing repeated experiments. Authors have used the data for experimentation on different human parameters, and a comparative analysis of ANN and RNN is done.

**M. Shah et al., (2016)**

The proposed model provides forecast of the monsoon at a long lead time which supports the government to implement appropriate policies for the economic growth of the country. The monsoon of the central, north-east, north-west, and south-peninsular India regions are predicted with errors of 4.1%, 5.1%, 5.5%, and 6.4%, respectively. The identified predictors show high skill in predicting the regional monsoon having high variability. The proposed model is observed to perform better than most of the prediction models.

**Karandeep Kaur (2016)**

The author has tried to provide a brief overview of various machine learning applications in Indian agriculture, to help farmers advance their work manifolds. Author has described what is Machine learning and its technique such as reinforcement learning, supervised and unsupervised learning. While studying the applications in agriculture author has taken into consideration various parameters such as crop selection, crop yield prediction, weather forecasting, smart irrigation system and crop disease prediction and hence deciding the minimum support price. Considering all these parameters, the best suited algorithms are suggested respectively with the help of literature survey. Author has concluded his research saying the high accuracy of AI machines is the result of machine learning algorithms. one of the example is sensor based farming system for increased precision. Prescriptive solution for more complex problem in case of large data and field size is yet to be done.