

# Improved Transformerless Inverter with Common Mode Leakage Current Elimination for a Photovoltaic Grid-Connected Power System

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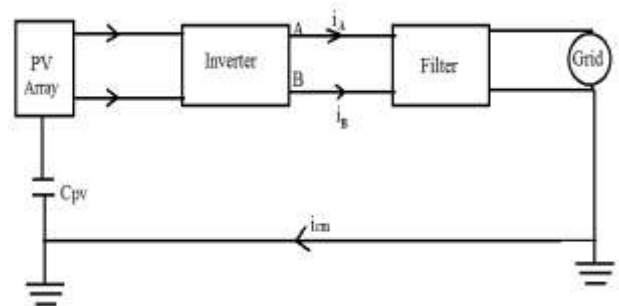
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**Abstract** - Today's demand of low cost and high efficiency of the transformerless inverter topology, it becomes most popular in Photovoltaic (PV) grid connected power system. The elimination of transformer reduces the size, weight and cost of solar power conversion system. But when transformer is eliminated, there is galvanic connection between PV panels and grid exits which leads flowing of Leakage current due to formation of parasitic capacitance between PV panels and ground. This report present's single phase transformerless inverter with different control techniques to eliminate common mode leakage current. The unipolar sinusoidal pulse width modulation (SPWM) control strategy as well as double frequency sinusoidal pulse width modulation (SPWM) technique is proposed to achieve three level output of the inverter. The double frequency sinusoidal pulse width modulation technique is used to achieve the higher frequency and lower current ripples. So that the total harmonic distortion in grid connected current is reduces greatly. This report deals with Simulation of proposed method in MATLAB with both unipolar SPWM and double frequency SPWM and a proto-type is built with double frequency SPWM.

**Key Words:** Parasitic capacitance, transformerless inverter, SPWM, photovoltaic System, Common mode leakage current.

## 1. INTRODUCTION

Step by step the commitment of sustainable power source is expanded in complete vitality expended on the planet. Among every sustainable source like sun oriented, wind, hydro etc. the nearby planetary group or photovoltaic framework is most steady and solid vitality. Presently multi day, the sun based vitality advances have turns out to be more effective and more affordable than the conventional advances. The sunlight based vitality turns out to be most prominent on the grounds that it is cleaner and more ecological benevolent than different sources like petroleum derivatives, atomic, coal and so forth. Anyway the significant points of interest of photovoltaic framework are that, it has no moving parts, it has a long life and furthermore it requires less upkeep. The sun based vitality transformation framework is for the most part comprising of the photovoltaic boards as an immediate current (DC) generator, inverter and channel. The inverter assumes significant job in photovoltaic (PV) control transformation framework.



## 1.1 STATEMENT OF PROBLEM

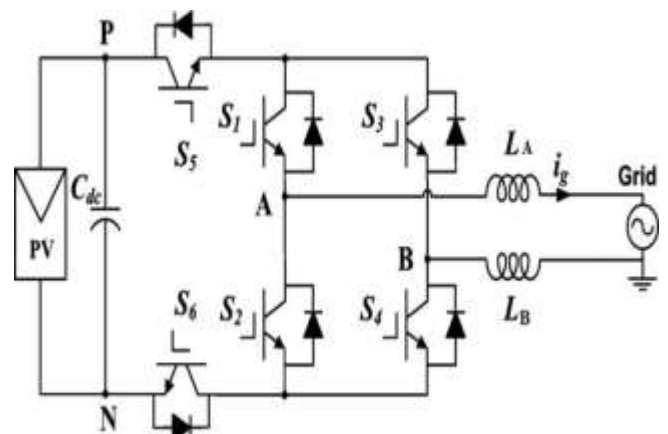
As per the investigation as we remove transformer from photovoltaic (PV) grid connected power system following are the adverse effects taking place

- i) Parasitic capacitance forms between grid and PV panel.
- ii) Common mode leakage current flows due to this capacitance.
- iii) System efficiency decreases, quality of grid connected power is also reduces.

## 2. SIMULINK MODEL OF PROPOSED INVERTER

### 2.1 Proposed Inverter Topology

Figure demonstrates the improved network associated inverter topology, which is proposed for killing basic mode spillage current. In this topology, two extra switches S5 and S6 are evenly added to the customary full-connect inverter.



# Proposed Work For Waste Water Treatment By Using Low Cost Materials And by Filtration And Disinfection Process

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**Abstract:** The project proposes a waste water treatment plant that will provide water to meet the demands of water on small scale basis. The waste water treatment system components were designed and they consist of water cans, piping system, filtration disinfection and storing system. The project includes upper head water storage tank which is situated at the top and second water tank for storing pure water after filtration process. The filtering media used were fly ash, fabric, baggas, coarse gravel, foundry sand, pebbles which was removed after 3 weeks and washed carefully with distilled water and dried. The waste after passing through filtration bed goes into the disinfection tank and finally stored there. When there is a need of water, this water can be delivered.

**Key Words –** filtration, disinfection, activated charcoal, flyash, fabric.

## I. INTRODUCTION

Panchganga river is the most important river in relation to water supply and availability. The main problem is only one that water is Panchganga river is polluted at its extreme level. People dump all the waste like, religious waste, biodegradable waste, funeral waste, industrial waste directly into the river. Determining the water supply quality is mandatory. The main properties which show the purity of water are its physical, chemical and its biological characteristics. This characteristics will help us to determine the need of water treatment for consumption of appropriate water determined by national standards. The waste water treatment implies to use of chemical materials which is not very effective for workers. The pollution of Panchganga River is badly affecting the health and environment along the river bank. People living in this area are surviving from this polluted water and bad smell due to dead fish and waste.

All surface water varies in quality throughout the year and in rainy season. Every method of water treatment has different level reducing toxicity and improving the quality. In this present paper the waste water is treated by using low cost materials like fabric, activated charcoal, fly ash and rice husk, foundry sand, coarse gravel.

## II. OBJECTIVE

The main objective of this water filtration plant is to reduce the turbidity, colour, and odour and to make the water safe for drinking purpose. Activated Charcoal is used to remove the contaminants and impurities. They are the most effective and useful in water purification. The rice husk possesses greater properties and high energy power. They are composed of organic matter and silica. With the help of this composition it removes colour, odour and dissolved organic substances. Rice husk is biomass material which is cause effective and easily available. Fabric is very much essential part of nearly all industrial process which contributes the purity of product. Fabric can be used as a solid-liquid separation material at the base of water filtration plant. Beside this foundry sand, coarse gravel is used. Main objectives are-

1. To understand the connection between water pollution and its effects of people consuming it.
2. To reduce the toxicity level by using low cost materials like fly ash, rice husk, baggas, activated charcoal, fabric.
3. To plant a water filtration plant which is feasible to everyone and to fulfill the needs of water.

## III. MATERIALS

The different material used is fabric, activated charcoal, fly ash and rice husk, foundry sand, coarse gravel. The properties of each materials is described in detail below-

a) **Fabric**-In earlier days, the filter fabrics were produced by weaving yarns spun from natural fibers such as cotton which on wetting, would swell to produce highly efficient media the fabric will provide a long trouble free performance.

b) **Activated charcoal**-activated charcoal carbon filters are most effective at removing chlorine, particles such as sediment, volatile organic compounds, taste and odor from water. They are not effective in removing minerals, salts and dissolved inorganic substances. Activated carbon is carbon produced from carbonaceous source materials such as bamboo, coconut husk, coal and petroleum pitch. It can be produced by physical activation. The activated charcoal is a good filter material because of its greater surface area which gives countless bonding sites. When certain chemicals pass through carbon surface, they attach to the surface area and are trapped. Active charcoal filter are works very effectively.

# Proposed Work For Waste Water Treatment By Using Low Cost Materials And by Filtration And Disinfection Process

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# A Machine Learning Approach to Predict Crop Yield and Success Rate

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**Abstract-** In India agriculture contributes approximately 23% of GDP and employed workforce percentage is 59%. India is the second-largest producer of agriculture crops. the technological contribution may help the farmer to get more yield. The prediction of the yield of different crops may help the farmer regarding taking the decision about which crop to grow. The research focuses on the prediction of different crops yield using neural network regression modeling. The data of crop cycle for summer, Kharif, rabi, autumn and whole year is used. The dataset is resourced from an Indian government website. The experimental parameters considered for study are cultivation area, crop, state, district, season, year and production or yield for the period of 1998 to 2014. The dataset consists of 2 lakh 40 thousand records. The dataset is filtered using Python Pandas and Pandas Profiling tools to retrieve data for Maharashtra state. The model is developed using a Multilayer perceptron neural network. Initially the result obtained considering optimizer RMS prop with accuracy 45 %, later it will be enhanced to 90% by increasing layers, adjusting weight, bias and changing optimizer to Adam. This research describes the development of a different crop yield prediction model with ANN, with 3 Layer Neural Network. The ANN model develops a formula to ascertain the relationship using a large number of input and output examples, to establish model for yield predictions an Activation function: Rectified Linear activation unit (Relu) is used. The backward and forward propagation techniques are used.

**Keywords-** Indian agriculture dataset, Neural network, Machine learning, linear regression, multiple regression, Relu-activation function, Crop Yield.

## I. INTRODUCTION

Forecasting yield of crops will surely help the farmer. The farmer can make a decision about crop choice and can contribute more to its profit. There is a large number of crop yield prediction models available which may use weather real parameters or static parameters. Machine learning is found to be a very appealing field that can contribute to the agriculture field. The different models built using machine learning can take different crisp inputs to give some concrete output.

This research proposes the Neural Network model to predict crop yield and success rate of crop depending on the dataset provided by the Indian government. The dataset is huge containing data for all the regions of India which were filtered to get data for Maharashtra state i.e. 12000 records. The crop yield prediction model uses backpropagation algorithm of Artificial neural network. A multilayer perceptron technique is used.

The aim of the research is the development of the crop yield prediction model by considering data for 10 districts of Maharashtra for approximately 20 crops.

## II. LITERATURE SURVEY

In this paper, the author has discussed effect of weather conditions on crop yield. The paper focuses on artificial neural network technology. The parameters used are sensor parameters such as type of soil, Ph value, N, P, K values, etc.[1]. Multilayer perceptron model is developed by using neural network. The accuracy of the model is validated using cross-validation. The weka tool is used for execution. The accuracy obtained is 97.5%. Performance summarization is shown using ROC FIGURE[2]. Appropriate pesticide and insecticide suggestion are given prior. Main aim is comparison of ANN and CNN algorithm for better forecasting of crop yield[3]. Paper focuses on description of different number of agronomic based models. Models have used artificial neural network algorithm. This model focuses on development of crop [3]. Assessment of Loss and usage of insecticide, nutrient and pesticide [4], Estimation of retention of water by soil [5], similarly prediction of disease [6]. Crop yield prediction using aerial pictures have been utilized for taking decision-related harvesting [7]. Artificial neural network model gives accurate and reliable results for prediction of crop than simple linear regression model. [8]. ANN models compared to traditional statistical methods found better for predication of soybean rust by [6]. The backpropagation network model of ANN is used to predict rice yield by considering weather data. [13]. 14.8% testing error for maize yield prediction is obtained for model executed on parameters like soil, rainfall [15]. Prediction of rice yield by applying used neural networks produce testing error of 17.3% [16].

This paper reports on the use of Artificial Neural Networks to predict the rice crop yield for Maharashtra state, India.

The proposed work focuses on the use of Artificial Neural Network to predict the crop production to help the farmer to make crop choice for harvesting. The aim of the research is

1. Performance evaluation check of Artificial Neural Network multilayer perceptron model used for prediction of crop yield.

2. Finding the relationship of parameters to the accuracy and improvement to accuracy by the effect of addition and removing of parameters considered while experimenting.



# Data Mining Technology with Fuzzy Logic, Neural Networks and Machine Learning for Agriculture



Shivani S. Kale and Preeti S. Patil

**Abstract** Farmers countenance failure as the crop cultivation decisions by farmers always depend on current market price as the production sustainability processes are not taken into consideration. So there should be some platform which guides the farmer for taking correct decision depending on their need, environment, and changing seasons. The system proposes Marathi calendar using nakshatras which guide farmer for crop cultivation decision. It aims to create methodologies to strengthen the farmers' economic conditions by providing informed decisions. The methodology used for the system specially uses data mining to generate expert decision along with the fuzzy logic, machine learning to give decisions appropriately to farmer for cultivation of expected crops.

## 1 Introduction

Agriculture theaters a vital role in India's financial system. Exploration in farming is intended for the sake of increased crop production at cheap expenditures and with amplified yield. Not only final product (crop produced) should be acceptable but also processes to develop that product should also be sustainable. Today's need is to train the farmer with sufficient as well as useful techniques necessary for farming. The farming usually depends on weather conditions and monsoon predictions. Each specific day in each and every season, according to farming practices has its own tasks to be worked out and if it is followed correctly it will consequence in increase yield of production.

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Short communication

## Synthesis and photophysical investigations of pyromellitic diimide based small molecules

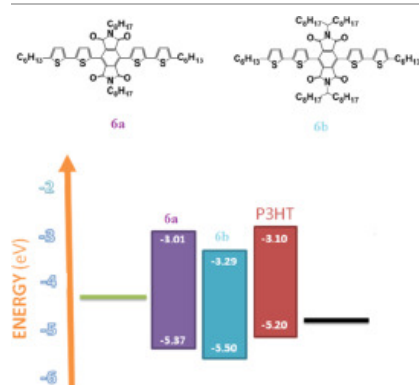
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### Abstract

The present work reports on the highly efficient microwave assisted Suzuki coupling reaction for obtaining pyromellitic diimide based symmetrical small molecules with donor-acceptor-donor (*D-A-D*) configuration. Electron rich bithiophene is employed as a donor and alkyl substituted pyromellitic diimide units are explored as acceptors to get the desired small molecules. In order to study the relation between chemical structures and material properties, the prepared compounds were characterized in detail using absorption spectroscopy, cyclic voltammetry and thermogravimetric analysis. The compounds exhibited good thermal stabilities with high decomposition temperature. Photophysical investigations of the newly synthesized pyromellitic diimide based small molecules, suggests these materials as potential candidates for organic electronic applications.

### Graphical abstract

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### Introduction

# Novel Routing Protocol for Secure Data Transmission in Wireless Ad Hoc Networks

Arage Chetan S, Satyanarayana K V V

**Abstract:** The crucial requirement in MANET is to establish the efficient path among destination and source nodes based on the cooperation among the mobile nodes. The routing protocols trust the mobile nodes for data transmission. However, MANETs are vulnerable to various security threats. The attacks like grayhole, blackhole, Denial of Service (DoS) attacks etc. performed on MANET. The presence of such malicious nodes in network may lead to serious concerns related to network security. The most of existing security methods for MANET consider the packet delivery rate (PDR) parameter to detect malicious nodes. However, the node mobility, frequent link breaks, queue overflow etc. may be the other reasons for less PDR in MANET. For any security method, detecting the main cause of packet loss is vital. Therefore, along with cooperative security solution, methods required to correctly identify the reason of packet losses. In this paper, we proposed hybrid cooperative bait detection system (HCBDS) in which the reverse tracing and correct identification of packet losses algorithms proposed to correctly detect the malicious node in network. Using the network parameters the accurate reason of dropped PDR determined. The results presented in this paper show that our security model achieves significant improvement in performance under the presence of malicious nodes.

**Index Terms:** Cooperative bait detection, HCBDS, Mobile ad hoc networks, Packet losses analysis Packet loss parameters

## I. INTRODUCTION

The mobile specially appointed system implies MANET is the impermanent system in which the mobile nodes gathered autonomously on other nodes in a similar remote system. These nodes in such systems are moving subjectively everywhere throughout the total system. MANET systems [1] [2] are essentially assembling brief remote systems and they are not requiring any sort of foundation for conveying just as brought together organization. The communication among these nodes relies upon the sort of routing instrument utilized called multihop routing protocols.

Each mobile hub in the mobile system is working as the both sending hub implies routing tasks and host hub. Therefore as such we can say that, routing protocols for the mobile specially appointed system are presented for building the correspondence courses just as remote correspondence organize.

Working of dynamic correspondence a course in the whole system is done among the source hub to destination hub for correspondence reason on interest way and consequently this is the center usefulness of MANET routing protocols. The mobile impromptu systems are not

having the settled system topology because of the reason that mobile nodes are much of the time changing their positions and development. System topology for the MANET systems isn't settled in view of the incessant nodes development in the system. Mobile specially appointed systems having diverse sorts of routing protocols like responsive, half and half, and proactive protocols kind of routing protocols. We can utilize these protocols with various system situations and versatility designs. The responsive protocols, for example, DSR (Dynamic Source Routing) protocol and AODV (Ad hoc on interest Distance Vector Routing) protocol are much of the time utilized MANET protocols. Aside from this, DSDV (Destination Sequenced Destination Vectoring) just as OLSR (Optimized Link State Routing) are instances of responsive protocols. Zone Routing Protocol (ZRP) is one sort of half and half protocol for the mobile impromptu systems.

Because of the breaking down, malignant and egotistical nature of mobile nodes are come about into acting up nodes. Any sorts of programming or equipment disappointments are in charge of the breaking down nodes. The narrow minded nodes are just tolerating the contributions from other mobile nodes in the system however not sending it to other sending nodes and simply dropping those parcels. Vindictive nodes in the system bringing other mobile hub into a misguided course as opposed to the planned heading by publicizing data that he has most brief way for the expected beneficiary of data. This assault is called of DoS assault. All the got bundles are dropped by the noxious nodes. If there should arise an occurrence of dark gap hub assault, getting rowdy conduct of the nodes came about into the specifically droppings of bundles. Along these lines because of this sorts of assaults, MANET organize turns into the valunearable for the poor execution treats of utilized routing protocols. There are numerous arrangements are presented for tending to this remote systems assaults and still the inquires about are going on. Be that as it may, in the event that we include the routing instrument for this system, it came about into the execution debasements and lower throughput for those systems.

As the interchanges in MANET perform agreeably, cooperation is normal by all nodes so as to guarantee a legitimate usefulness of the MANET. Be that as it may, numerous intrinsic limitations, for example, continually changing topology and completely circulated design, make these systems powerless against different assaults by making trouble nodes. Instances of such assaults are: (an) a

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# An Experimental Analysis on Various Techniques for Malicious node Detection in MANET

Chetan S Arage, K. V. V. Satyanarayana

**Abstract:** Mobile ad hoc networks (MANETs) are a subclass of wireless ad hoc networks having exceptional characteristics of dynamic system topology and moving nodes. MANETs are infrastructure-less, self arranging networks intended to support mobility. Because of these attributes, there is need of separate routing protocols for MANET. The advantages such as non-limited versatility, simple organization attributes of MANETs make them exceptionally important and very reasonable mainly for crisis situations and military applications. Within the sight of malevolent nodes, this prerequisite may lead to genuine security threats; for example, such nodes may disturb the routing process. In this specific circumstance, avoiding or identifying malicious nodes launching grayhole or collaborative blackhole attacks is a challenge. This paper is focuses on surveying and a reviewing of MANET security attacks and approaches to defend from vulnerabilities. The routing protocol mainly concerned in this approach is Dynamic Source Routing Protocol (DSR). The schemes like Watchdog, TWOACK, AACK, EAACK and CBDS have been used for detection of malicious nodes in MANET. Our research aim is to identify current trends, open challenges and future research directions in the deployment of MANET by considering the malicious node detection scheme. In order to bridge the research gap in terms of performance, detection rate and overhead; also to overcome the challenges of existing security issues regarding MANET. The aim is to propose an improved cooperative bait detection scheme (ICBDS) to detect malicious node maintaining minimal overhead.

**Keywords :** Watchdog, Mobile Adhoc NETWORK (MANET), Security, Enhanced Adaptive ACKnowledgement (AACK,EAACK).

## I. INTRODUCTION

Exploitation of network due to malicious node attack disrupts the reputation, trust and confidentiality of using total network. Further it may lead to trust and privacy issues and can prevent the users using the concept of MANET. There is a chance of new flaws because of development of new code or software in today's life.

### 1.1 Security attacks categorization in MANET

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The approaches like EAACK, Watchdog, TWOACK are prone to false alarms and false detections. In such kind of situation MANET will collapse, no matter which security measures and solutions are being used. Thus, it is required to re-modify and preplan the whole network which eventually may lead to high routing overhead in terms of cost. Although there are a lot of enhancement in technology of MANET, but it is vulnerable to many existing and new security attacks and so it needs to be addressed. Passive attacks include the release of message contents and traffic analysis while active attacks can be divided into, masquerade; reply; modification of messages and denial of service.

Following major attacks can be challenge to the working of MANET [25].

#### 1.1.1. Denial of service attack (DoS)

This kind of attack is especially on availability and it is executed by making the resource unavailable for authorized users. This attack works by sending the jamming signal into the communication channel so preventing legal users from accessing the network and its resources. Attacker eventually sends huge amount of garbage traffic to a particular node and makes disruption in routing process. Attacker may also drop all the packets forwarded to it and makes traffic information unavailable for other nodes in network.

#### 1.1.2. Distributed denial of service attack (DDoS)

In this attack instead of single attacker, multiple stations acts as an attacker to overwhelm the node.

#### 1.1.3. Tampering with the information

In such attack, an attacker may tamper the information like current location, routing packets information to disturb the MANET functionality.

#### 1.1.4. ID disclosure

This attack involves disclosing and stealing the identities of other nodes and uses this identification for further attacks on MANET.

#### 1.1.5. Wormhole attack

It involves two or more than two malicious nodes and packets from one end





# Prediction of Sugarcane Yields from Field Records using Regression Modeling

Shivani S. Kale, Preeti S. Patil,

**Abstract:** Prediction Of Sugarcane Crop Yield Benefits The Farmer To Get Best Possible Decision Regarding Sugarcane Crop Cultivation. The Purpose Of This Work Is To Identify Possible Relationship Between N, P, K Fertilizer, Water Resource And Planting Densities.

The Algorithm Used Is Multiple Regression. The Paper Focuses On The Generation Of Multiple Regression Models For The Dataset Of Sugarcane Crop For Season Adasali, Suru And Preseasonal Method. The Intercept And Slope For Variables Are Calculated And Equation For Each Model Is Generated. Sample Of N,P,K And Other Are Considered For A Period Of 7 Years From 2012 To 2018. Data Of Experimentation Is Collected For Arid Region I.E. Pandharpur, Maharashtra State.

**Keywords:** Prediction, Crop Yield, Regression Analysis

## I. INTRODUCTION

As we know India is the land of agriculture, approximately 70 % of population constitutes farmers. As in last few years the extensive boost of population raises the question of fulfillment of food requirement. So the slope of production needs to be at increasing order. Due to technological enhancement in agriculture practices which results in increased in production for initial certain years. But after some years usage of fertilizer and unpredictable weather conditions has make production of crop as challenging issue.

So the improvement in crop production to contribute to national income is needed. So prediction of yield and recommendation of fertilizer will surely help the farmer for getting good output yield. The multiple regression algorithm considers parameters such as N, P, K to predict yield and try to find out the relationship with the input parameters and output parameters. The data is visualized with respect to different parameters using jupyter, python. As it will help to make clear parameters dependencies with output and other variable. There are four methods of Sugarcane cultivation in Maharashtra. Maharashtra is the second largest producer of sugarcane in India. The research for increasing sugarcane production will be helpful to gain more production.

The fertilizer recommendation for sugarcane crop can be done by considering N, P, K parameters as well as Ph value of soil. This will surely help in cost cutting of fertilizer usage and more production as well as land fertility can kept intact. The following table shows the sugarcane production of Maharashtra. Sugarcane is also identified as one of the major cash crop.

**Table 1: Sugar production of Maharashtra (Courtesy: indianexpress.com/article/india)**

Production Year	Production of Sugar (Lakhs Ton)		Recovery of sugar(percentage of sugarcane crushed)	
	MH	UP	MH	UP
2011-12	89.96	69.74	11.67	9.07
2012-13	79.87	74.85	11.41	9.18
2013-14	77.12	64.95	11.41	9.26
2014-15	105.14	71.01	11.30	9.54
2015-16	84.15	68.55	11.33	10.62
2016-17	42.00	87.73	11.26	10.61
2017-18	107.21	120.50	11.24	10.84
2018-19	98.45	81.77	11.14	11.27

From the above table we get to know that India is producing Sugarcane as the highest contribution to national income. Also the recovery of sugar is also high for Maharashtra.

## II. LITERATURE SURVEY [2, 3]

**Table 2: Literature survey**

Author and publication	Techniques applied	Variables considered	Area o grow
Saeed Khaki,2019	deep neural network	genotype, environment,	black box property
Mrs.K.R.Sri Preethaa,2018	Bayesian algorithm	Parameters of soil, fertilizer used, duration of crop and humidity	Suggestion of pesticide for different type of disease
Dr.A.Senthil Kumar, P.Arun,2017	K nearest neighbor, Artificial neural network and data mining techniques	Comparative study	-

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