

A REVIEW

Smart computing trends towards green revolution

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ABSTRACT

Green revolution initiatives occurred between the 1930s and the late 1960s around the world, notably by Norman Ernest Borlaug, Cresco, Iowa, US. born. Later transformed to India by Mankombu Sambasivan Swaminathan, who was born in Kumbakonam, Tamil Nadu, IN. He was one who known as the father of the green revolution, also the back bone for green research findings of high-yield varieties of wheat and rice in India. Also, administrative contributions towards various green initiations. Today in the era of computing will deliver growth in various fields, including industries called Industry 4.0 in, similar to that Information and Communication Technology obtain development in various fields, which directly and indirectly related to our agriculture. Even Agriculture needs to be getting various up-gradation by which not simply by hardware and software. The modern scientific societies state that the era of developing software applications is not enough for the next generation growth, it needs technology growth for today's findings. As same Identifying and incorporating, those innovative technologies based scientific findings for delivering the solution for next generation green revolution is the most challenging issue today.

Key Words : Agriculture, Green revolution, Smart computing, Big data analytics, Technology

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After land, water, food, culture, language and economic growth consider as an asset of the nation now top of those called data. Extraction of value from it delivers better knowledge and predicting future of thenation. Agriculture is the backbone of the human. Similarly, data are the backbone for future prediction also feed for computing. Better data delivers a better solution for the problem for that we are using various tools and techniques. Where that existing tools and technique fails we adopt a new technology called Bigdata to extract better value from it. In such a way in

agriculture, we need a solution for different problems from different dimensions ora different field of studies. Computers are playing a vital role and act as the platform for those fields growth. Industries are the artificial transformation of agriculture towards similar output called production in managerial aspect. We can compare both by the similar expectations such as high yield, good quality, Fast production, etc. Similar to that in consumer perspective, we are looking for eco-friendliness (in agriculture bio-organic), durability (in agriculture food preservation), low-cost, quality. In agriculture expect few

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variations we are expecting the same. Now today, both the field stands in front of similar technology demands and social demands. However, for Industry German already seeded for technology modeling called Industry 4.0, It is now in the phase of implantation. However, agriculture facing various problems to implement it. Because lack of technology, skill and failure in delivering an economical solution which can be adequate to all.

For all, computing is the centric part. So the team of researcher and volunteers from different organization and academic institutions join under the organization called 6th sense research foundation to make a generic solution for needs of computing requirement for cutting-edge technologies under the project entitled unique sense. The ultimate purpose for unique sense is to architect smart computing, as an initial step, they deliver a solution from cutting-edge hybrid technology combination from hardware and software to deliver the solution for basic needs from a different perspective. By providing a solution to industries, medicines, mathematics, etc. It should contribute only to that steam or supporting steam alone or the part of civic. However, the contribution towards agriculture it is for all living things, which consume foods from this nature.

Smart computing:

Today information technology stands for different Technology, which incorporates different Techniques, algorithms and Hardware stacked to provide a different solution for different needs. However, ultimately we are extracting the common things and wrapping generic together as computing. There is no such common definition or architecture for smart computing today. Mostly it is a magical term, which satisfies needs of future findings and demands. So far different society and forums deliver smart computing is the solution for IOT, cognitive computing, AI, etc. However, Unique sense moves top of it by identified different needs altogether and delivers basic architecture for smart computing even it is a long journey its seed for new branching of computing called smart computing.

Unique sense:

Unique sense is the Phenomenon project, which towards to opens the doors of Mind-boggling computing called smart computing. It is the spark of delivering Linchpin of today’s Technology, engineering and scientific

needs of this society. It unleashed the Interpreters of basics Sought of smart computing in our daily life, people consuming, directly and indirectly, utilize the computers and computing from different dimensions. Behind the scene, they do not know the conniving aspects of their consumption. Because the trending approach in utilizing the system is to access it in multiple ways, similar to our smartphones. People occasional think about what they consume is especially customizable for need. “UNIQUE SENSE” having Potential to change the needs and solves the riddle of the technology needs. The Phenomena is to make the simplest solution for the complex problem with an Ambition to deliver it in the eco-friendly and economically friendly manner. Also, it enriches the needs of today technology demands. Also, this book delivers posted approaches from Very edge needs of smart computing today.

Green trends:

Information technology belongs to two major pillars data and computing. For most of the field without domain perspective. The information, we received from any sources in the format of digital or analog for computation, we consider it as data. It can be computed to extract solution for the problems.

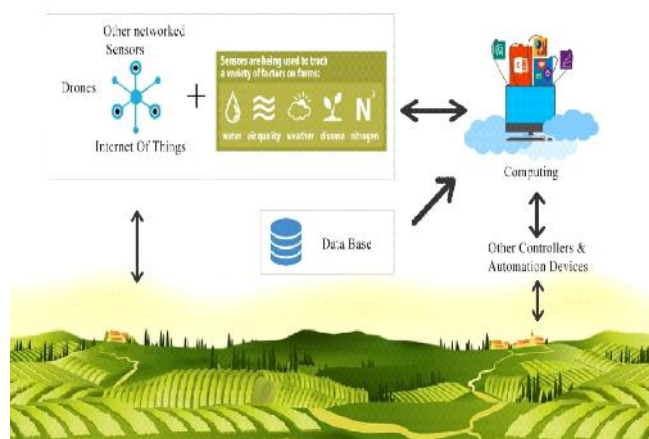


Fig. 1 : Green revolution model

Data:

There are different sources, generating different information in different formats. Sensors are the artifact sensing system, which also helps to sense this real world automatically. Those were traditionally called as sensors now transformed into a next generation information source called IOT’s. Even images, sounds, also sense by

the sensors later converted to digital data or signal for computation. Data from different domains should incorporate to deliver a better solution for DNA information about the plant, image of an insect, Remote sensing images of that land, etc.

Computing:

Computing is the art of extracting the solution using Technology, which implies hardware, software, algorithm, etc. It does not mean any software or hardware. even some time it can obtain the name belongs to hardware or software or by property (e.g., mobile computing, cloud computing). It is centric for the green revolution which creates the need for it. By the integration of parallel I/O, scattered sensor, and IOT creates demands for parallel. Moreover, to handle few properties of data such as high volume, variety, the velocity, also needs to compute it, virtualize it, and taken to the next step make extract value from it for decision-making and future prediction. Also, the software gets needs to provide a solution for developer friendly drivers and user-friendly business and Administrative tools.

Controlling and automation:

The green revolution needs to be guaranteed self-aware and react like human senses, so we need to communicate and integrate with components like IOT, the programmable logical controller (PLC), relays and other embedded components, etc. Should act like having minimum AI and self-controlled system. It is the end source which going to be communicating with field and related. These are the primitive work force need up-gradation and integration for transforming agriculture.

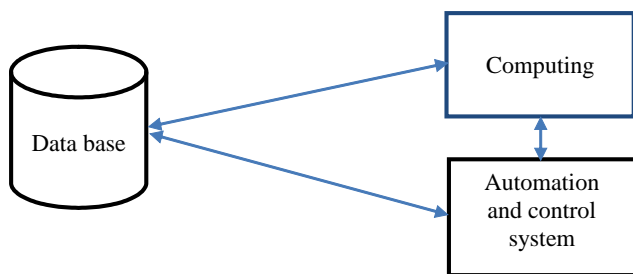


Fig. 2 : Simple paradigm of green revolution

The green revolution model:

Green revolution precisely focusing towards cyber controlling and Automation Architecture by which achieving, components like sensors should provide

a feature to sense behavior like self-aware and self-predictive which leads to degradation monitoring and provide life prediction, which should lead us to production efficiency. Farm controllers should aware, predict and compare which leads to maximum resource deliverance and predictive health monitoring. In that same aspect, it should communicate with networked farming with similar geographical attributes and different, provide worry-free farming with its attributes self-configuration, self-maintain, self-organize. The green revolution needs to transform agriculture from a production model to a service business model.

Design principles of green revolution:

Design principles are the key thing to drive anything in real-time for making any architecture or to deploy new technology. For creating and standardizing the design principle need to consider certain things which are the system should deliver a solution for real needs and provide a vision for future findings, also possible to implement it. In this case, few design principles we can extract from industry 4.0 such as Interoperability, Information transparency, Farming assistance, decentralized decisions also need to comprise new design principles for a better solution. Therefore, here from our challenges starts.

Challenges and opportunities in green revolution:

Even information technology delivers a solution from different phases it fails to make revolution over there. Still, we have not given handy solution for the end users (farmers). In positive approach, we can take it as opportunities still had to contribute our skill to this human society. Green revolution does not belong to hardware and software it is beyond that called technology. A lot of development and customization needed to achieve it. Similar to other field agriculture also have some mandatory demands. It needs an integrated solution, or the solution should act as a hotspot of different fields. Obviously, smart computing is the ultimate solution for the demands and needs, but even it needs integration from different fields and rapid development to be in the hands of farmers. For implementing anything needs a policy in such a way that implementing the green revolution also needs the policy to incorporate it. Even Unique sense prototype delivers computing solution, which can act as multi-purpose devices like as a controller and an automation device which can provide many opportunities with different possibility such as embedded

integration, physical clustering, application development, etc. for the green revolution.

With the rapid growth in population creates a huge demand for production. However, it should be affordable for everyone. So we are in need to adopt optimization from different dimension water management, soil management, Land optimization need to cultivate within the space, also looking for high yields. Some have a successive story even few not have that type of record because agriculture depends on various balancing parameter. That parameter belongs to various fields of study, experience and experiment. However, Human lifespan and diet will not provide time to do it all. Therefore, we need to integrate scattered solution based on different data like soil information, water, moisture, seed type, guidance for handling those varieties of seeds and plants, protection from different disease and insects. Altogether provide a fruitful solution to the farmer.

Simple unique sense prototype for green revolution:

Unique sense is the hybrid combination of hardware and software. It provides fault tolerance platform for data provisioning and parallel processing with compactable for IOT integration. It enables parallel I/O for Bigdata analytics. The system principle is primitively focusing towards a low-cost solution with a maximum possibility of usage. In the aspect of design, the compactness of the system delivers easy physical clustering to create a dynamic controlling environment for the green revolution. In addition to that provide value for Business and human principle. It delivers the economic solution and eco-friendly solution by enabling the Reduce (e.g., size, power, etc.), Reuse (Different purpose, customization, enabling based on-demand, etc.), Recycle (which can recycle for a different purpose with low hazard wastage compare with bigger size computers) principles of eco-friendliness. Also, It can help capable of acting individual system with the customized working environment. There is two possible way to power up our system. However, in this, we choose micro USB instead of GPIO for achieving quick stability based on available resource. However, In this case of providing power to I/O components, we continuously give 2A - 5 V to meet basic power consumption requirement. After that Code-named wheezy is the one of the stable version from Debian, Linux

distribution. With the future of multi-arch which support 32 bit runs on the 64-bit Operating system and its feature extends to support arm. So here in this work, we choose it as one of the supporting systems for Hadoop on ARM architecture. Therefore, we utilized Raspbian, Debian wheezy Linux operating system Kernel Version 3.12 and Released on 9th September 2014 from the Raspberry supporting site. Later java has been installed on that architecture because we need JVM for pi. Because Hadoop framework deploys on it to for the execution of separate threads for parallel processing and so on. Here in this prototype, we installed Open JDK-7 version 1.7.0_07. Then we create a new user called hd user especially to avoid collision, later we add it to the group to access the file system.



Fig. 3 : Unique sense: Prototype model

Hadoop 1.1.2 installed on that architecture then SSH key created and shared with the required user account for connecting the system remotely using SSH secure shell. Then HDFS created within the linux architecture for that special space allocated with dynamic memory allocation. Then the ownership for accessing that location shared with hduser for file system access, with the privilege to the user such that 750 is the common type of permission where users can process, read, write and execute (Traverse for directories). It limits the group users for doing the operations read-only, execute and denies write operation. It can also avoid data writing

violations from other intrusions. Hadoop name node-format this command formatting file system at the location specified in `hdfs-site.xml`. After those installing the required component in Linux, most commonly we need to start the process manually. Here the `start-all.sh` starts the required components of Hadoop such as name node, data node, secondary name node, job tracker and task tracker. The `jps` tool lists the instrumented Hot Spot Java Virtual Machines (JVMs) on the target system. The tool is limited to reporting information on JVMs for which it has the access permissions. The numeric value represented before the instrumented JVM is its identification number.

This smart computing prototype is the initial step for integrating IOT, computing and embedded systems all together for delivering a solution for the upcoming demands of society. It does not belong to proposed hardware or software. It's a technology architecture to fulfill the generic needs of computing. Also, we have a tremendous opportunity in this field of agriculture to contribute like a traditional seed, plantation analysis also to enrich personalized seed for different demands also act as medicine for different diseases from the food itself. Today world looking for biodiversity instead of hazardous chemical fertilizers, computations are capable of identifying right choice for it by using it efficiently. This computation is the hotspot for this kind of needs especially quick and complex solution, which can elaborate easily. In technical aspect, for the demand of simple and clustered solution requirement.

Conclusion:

Computing solution is getting ready for next green revolution in the name of "UNIQUE SENSE" smart computing technology. It is an ultimate solution of biodiversity, economically friendly, compact and capable of the different problems of today and future computing demands. We can call it as a generic solution for various problems in today's scenario includes agriculture. It should be the best optimal solution also the adequate seed for next green revolution, also by supporting various branches, which supports agriculture field. Green revolution not been happen by a single domain. However, it belongs to centric demand called computing supports the power of data, also extended to embedded system support. Unique sense is a seed for next green revolution still team working hard to make it fruitful solution for rapid

growth in technology demand.

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