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Proposing ELA (Environment Learning Algorithm) for Enhancing humans and Epigenetic Robotics Skills

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Abstract- The epigenetic robotics helps to eliminate the inbuilt constraints on robotics that are pertaining to specifically task dependent. Recently Epigenetic Robotics has emerged as new cognitive modeling approach in the field of Artificial Intelligence for modeling of Autonomous Mental Development. Researchers have made an attempt to develop new behavioral skills in the epigenetic robotics in different environments that would facilitate the learning skills of machines utilized by human to improve the mental development and growth of a child. This revolutionary technology is based upon Artificial Intelligence needed for further development of these machines that would behave in a natural way like human being. Upon applying the technique mentioned in the algorithm "ELA" (Environment Learning Algorithm), humans will learn from machines and enhance their capabilities for better performance. The additional benefit for utilizing epigenetic robotics is to learn new skills autonomously through social interactions from different environments.

Index Term: Natural Intelligence, Artificial intelligence, Epigenetic Robotics, Learning Skills, Behavior, and Social Interaction of Robotics.

1. INTRODUCTION

Epigenetic Robotic belongs to interdisciplinary field and has a wide scope in the area of Artificial Intelligence. Different types of machine mechanisms, machine algorithms as well as machine structures are discussed in the area of Artificial Intelligence. For example, for sensing the movement, different types of mechanisms and algorithms are used in robotics [1]. These physical embodies of robotics generally use several different types of programs for performing several functions by utilizing several programming constraints so that robotics will behave accordingly in future. In this study, the major objective is to utilize Machine Intelligence in different prospective and receive efficient results than earlier in the form of human's Natural Intelligence. This idea gives a broader view to people as to how Artificial Intelligence professionals are moving one step forward to the human Natural Intelligence. An important key point is, it is not a real Natural Intelligence like human intelligence but it is more than Artificial Intelligence. That is why it is generally named "one step closer to Natural Intelligence".

After the great advancement in the area of Artificial Intelligence and in other related fields Artificial Intelligence professionals, experts and scientists will not challenge the Supreme power/Nature. Previous studies throw light on some of the important mechanisms for the design of special class of Epigenetic Robotics. Its aim is to provide open ended learning (i.e. a new type of learning from the existing environment) from the social environment through Real Time Interactions. The significance of the study relates to the special class of epigenetic robotics to improve or developmental growth of a human child [2, 3]. In addition, the benefit to utilize this special class of Epigenetic Robotics is to save man-hours as well as time in training a child. It will also give company to the child play time, which acts like a friend and also indicates that these natural human beings may have machine friends.

2. RESEARCH DESIGN

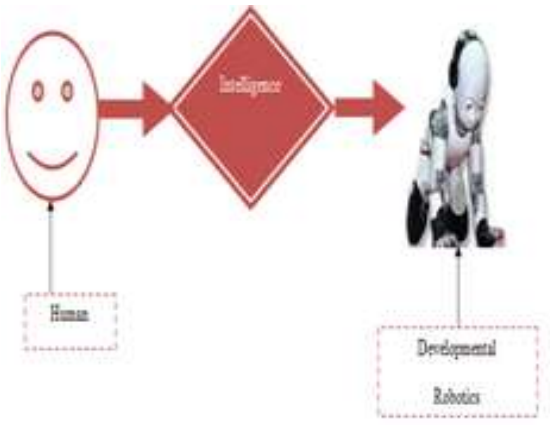

Figure.3: Intelligence act as an interface between Human and Epigenetic Robotics

3. A ROADMAP FOR INTELLIGENCE TRANSFORMATIOIN MODE (ITM)

This intelligence transformation mode explodes that how the machines behave naturally like human or infants. This new roadmap gives a step closer to Natural Intelligence but actually it is not real natural intelligence- in which machines show natural (in artificial form) behavior or intelligence by utilizing self-deriving brain structures in Epigenetic Robotics class. The representation of intelligence transformation mode can be diagrammatically shown in figure 4:

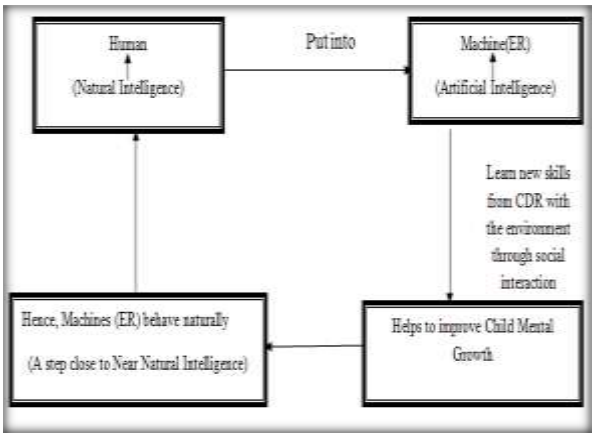

Figure-4: Flow of Intelligence Transformation Mode (ITM).

4. PROPOSED ALGORITHM- ENVIRONMENT LEARNING ALGORITHM (ELA)

Step-1) Find an object (i.e. Human) inside the room.
// through sensors and effectors ER can be
//easily detect the presence of humans at
//specified Location.
// (Object finding is based on the distance
//between the ER and object).

Object Finding: = Distance between ER + Actual Location of Object.

Step-2) IF Object inside the room is TRUE Then

Step-3) Check lime status of Object (In Motion (moving) or Motionless (Stationary))

Step-4) IF Object is Motionless then Go to Step 1
// Find another object inside the room.

Step-5) ELSE

Step-6) IF object is Moving (Object:=MOTION_STATE) as like hand movements and legs movement then Epigenetic Robotics Monitor their actions through sensors and effectors & record the whole movies in already embodied cameras in their physical body.
// the whole movie is recorded in ER self-
//made brain structure (Back End Database).

Step-7) Store Everything in ER Memory/Back End.
// i.e. Database of ER.
And Display Message **"**Do you want to execute?
Step-8) IF Answer is "Yes".

Step-9) Go to step 1 and repeat from step 1 to step 7.
//for teaching more actions of humans to
//other Human Infants for their mental growth
//development.

Step-10) ELSE

Step-11) END IF UP TO STEP 8.

Step-12) Stop Learning.

Step- 13) End.

5. DISCUSSION

The benefit to utilize this new designed algorithm is to save human time as well as energy to teach or train kids while learning through their actions in the existing environment and correspondingly provide eco-friendly environment to the kids with machines. In this way, humans take a better advantage of Epigenetic Robotics for the development of mental growth of a child.
Another advantage to utilize this new type of learning to facilitate people for the development of new skills in their new born babies (i.e. growing human infants) through machines like physical embodies of Epigenetic Robotics [4, 5]. In other words, natural human beings may also learn from the man-made artificially created machines. This new platform for open ended learning concept utilizes different developmental principles and mechanisms. As previous studies and surveys collaborates with the different professionals related to different fields for

developing new skills in human infants from existing environment through Social Interaction with the physical embodies. These physical embodies help in sharing the knowledge and information with the other human/infants. The expectation of several experts from this recent advancement is to prepare upgraded machines for future generation to behave like normal infant (i.e. only behave like Natural Human being, but actually it is not real human being'). In addition, this large amount of contribution of Epigenetic Robotics in Artificial Intelligence also provides a collection of some distinct features like "shows its autonomous learning behavior during Real-Time Interactions" with the environment [6]. This Real Time Interaction will only be possible through the embodied bodies of Epigenetic Robotics. In the absence of embodied bodies, the interaction between environment and Epigenetic Robotics is not possible. Before starting the interaction with the physical embodies, experts need to study its basic structure that includes number of sensors and effectors. Main functions of sensors and effectors is to collect data or information from the environment during Real Time Interaction with the environment while utilizing two different types of interactions viz. Natural Inter-Personnel Interactions and Social Interactions [7, 8]. One more additional unique feature "self-exploration" the self-made brain structures utilizing several principles and mechanisms will automatically be build in physical embodies of Epigenetic Robotics [9, 10].

In addition, Epigenetic Robotics will be implemented through path-following-method in future (if experts realize its need for further alterations in their physical embodies). Even this approach will not be always appropriate in most of the cases because it may fail sometimes, on that time when epigenetic robotics physical embodies will not react like physical reality (i.e. similar behavior like physical reality) [11]. Previous studies endorse, Epigenetic Robotics is big challenge for a scientific community these days. Scientists want to create Natural Intelligence in physical embodied machines (i.e. Epigenetic Robotics) like infants, so that in future artificial machines may behave naturally, like normal humans beings [12, 13]. By utilizing such type of machine intelligence, Autonomous Child Mental Development will easily be enhanced and correspondingly robotics successfully adapts new skills from the continuously changing environment [14, 15]. For implementing Autonomous Learning Behavior in machines, researchers took help from the different Cognitive Developmental Mechanisms (CDM) [16] in physical embodied bodies so that the improvement in their behavior takes place accurately (i.e. according to the design of developmental mechanism) and on the other side these machines use hybrid approach simultaneously for its effective utilization that can be diagrammatically represented in figure 1:

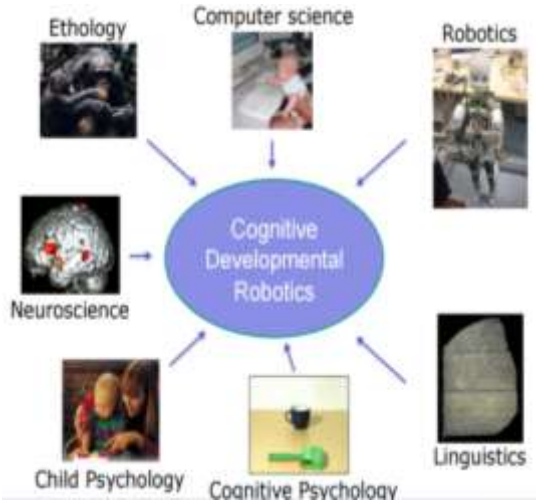

Figure-1: Cognitive Developmental Robotics – A Hybrid Approach [28].

The benefit to utilize this hybrid approach is its further use in several intrinsic learning principles for implementing autonomous learning behavior in the class of Epigenetic Robotics. These learning principles along with its design issues give the complete description or understanding of the basic concept of Human Cognitive Development Process (HCDP) [17]. As this study reveals several design issues used in the class of Epigenetic Robotics but the two most common design issues are listed below:

➢ Adapt dynamic environment efficiently during the management of complex tasks.

➢ Self-made brain structures inside robotics brain that may further provide Temporal Development Structure.

These design issues use several synthetic and constructive approaches in Cognitive Development Process (CDP). The main function of CDP is to provide Real Time Interactions with the body, brain as well as environment. If at once a Real Time Interaction with the environment through CDP is possible then automatically self-made brain structures will be prepared in their physical embodies and will work and behave accordingly (i.e. self-made brain structures. The main function of these self-made brain structures is to store own knowledge and user experience in the database of memory on the time of Real Time Interactions with the environment. In addition, the class of Epigenetic Robotics may take

one better advantage of the other class of robotics viz. Nano-Robotics and Toy-robotics etc. These robotics may use as an agent to another classes of robotics that shows an Epigenetic Robotics act as master and the other class of robotics act as a slave (i.e. for the same Epigenetic Robotics master). For implementing these self-made brain structures, neuroscientists generally use Epigenetic Robotics Architecture (ERA) that can be diagrammatically represented in figure 2:

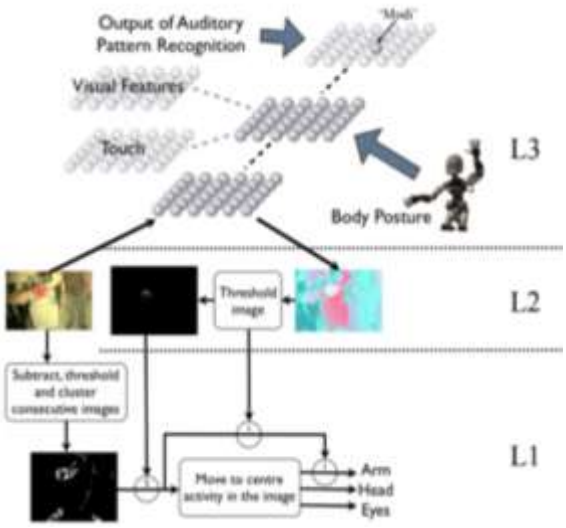

Figure-2: ERA- Epigenetic Robotics Architecture.

The motivation towards the utilization of ERA is to guide the modeling efforts to physical embody during their Real Time Interaction with the environment [18]. The real challenge noticed in the field of Artificial Intelligence is, everything in robotic machines are programming based constraints as programmers and experts embedded programs in robotics machines that will behave accordingly. This shows robotics is actually doing low skilled jobs. For example programming constraints put on Machines Robotics and this robotics will behave accordingly and except these pre-defined constraints will not do anything according to its wish. As an example, Robotics does not have ability to think like human or in other words, this robotics will not fully work as per the choice of human being. In this case, robotics acts as a Slave and human act as a Master.

In this study, a new methodology named Environment Learning Algorithm (ELA) is designed for providing a new method for Open Ended Learning through machine intelligence for achieving better performance and results in future so that machines will behave naturally in future like human infants. So, this new designed methodology may help to remove several programming constraints on robotics machines and contributing their efforts for developing new skills in the class of Epigenetic Robotics by utilizing Cognitive Development Principles (CDP) and learning mechanisms, in future that may facilitate the people of society for self-driving their own innovation through self-made brain structures in Epigenetic Robotics [19, 20]. The motivation towards the class of Epigenetic Robotics also help to develop new behavioral skills in human or human kids by utilizing autonomous learning behavior in two different environments viz. Real Environment and Virtual Environment.

As per study, this Epigenetic Robotics field has a great scope in future that is why till now scientists belong to different areas are working hard for achieving maximum success in this field.

6. CONCLUSIONS

It is concluded in the study that the Epigenetic Robotics is still in its infancy stage. This study discussed about the different cognitive mechanisms used in Epigenetic Robotics Architecture (ERA) along with its design issues. This designed methodology named "ELA" (Environment Learning Algorithm) may help to enhance human kids learning skills from the existing environment and correspondingly by copying their actions like hands and legs movements. In addition, Epigenetic Robotics may ask questions from kids by utilizing own self-deriving brain structures in their physical embodies and correspondingly develop new skills autonomously learning new behavior Through Real Time Interactions in two separate types of environments viz. Real Environment or Virtual Environment.

In this study, it is accomplished that said cognitive mechanisms used in Epigenetic Robotics plays a vital role for the improvement or development of mental growth of a child. The success towards this field is demanding joint efforts of many scientists that may belong to different fields like computer scientists, neuroscientists, psychologists, philosophers and engineers.

7. FUTURE SCOPE

Future scope of this study is to design several new Machine Learning Algorithms without having time bound constraints. By utilizing, these new designed Machine Learning Algorithms Researchers will easily learn more from the environment (i.e. by considering EVS given parameters like temperature, humidity, pressure etc.) through Social Interactions with the class of Epigenetic

Robotics (SICER). This may also help to develop new skills in Epigenetic Robotics like infants through self-learning from the environment.

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