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# MACHINE LEARNING PARAMETER LEARNING BY SIMULTANEOUS TRACK ALLOCATION TWEAK (STAT) ALGORITHM WITH VARIANT LEARNING FACTOR

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**Abstract- Machine learning is a field of computer science study that gives the computer the ability to learn without being explicitly programmed. A computer program is said to learn from experience E with respect to some task T and some performance measure P if its performance improves on T as measured by P improves with experience E. Parameter Learning is type of machine learning which includes the static evaluation and performance on static environment with the no environmental effects on the Task T. In parameter learning ratio always will be considered as positive as or greater than zero and less than 1. But when dynamically environment setup will change there will be drastic change in the dataset and computer will not able to learn the scenario correctly which leads to erroneous output. But with little tweak in the gradient descent algorithm with respect to the learning ratio computer will be able to learn the scenario and predict the outcome of performance P. This paper proposes the dynamic allocation and simultaneous update of parameter till computer leads to the convergence.**
**Keywords – Machine Learning, Parameter Learning, Gradient Descent Algorithm, Learning Factor, Convergence.**

## 1. INTRODUCTION

Machine Learning is field of computer science where the machine will gain the ability to learn without being explicitly programmed. In this field of science machine will able to learn the surrounding environment with some performance P for particular Task T gaining the experience E over the period of Time t. To learn the dataset or the task computer is performing is directly dependent on its learning factor or learning ratio of computer. Learning ratio directly depend on the environment and agent which have considerable/negligible role in the overall task. In short the proposed machine learning algorithm we can draw very small line of deference between the process and phenomenon.

## 2. PROPOSED ALGORITHM

*2.1 Simultaneous Tracking Allocation Tweak algorithm–*

In case of dynamically changing environmental scenario, machine learning need to be more accurate while performing the simultaneous update between the predicted and real-time values. Simultaneous Tracking Allocation Tweaking Algorithm (henceforth called as STAT algorithm) provides the machine more accurate value to learn about the scenario and performance the task with no prior experience E. As an American scientist Tom M. Mitchell defined Machine Learning should requires the Experience E for the learning process. Since experience cost huge amount of time t it will be limited to static data manipulation. But implementing STAT will allow the machine to react or cope-up with different scenario which machine didn't have experienced before.

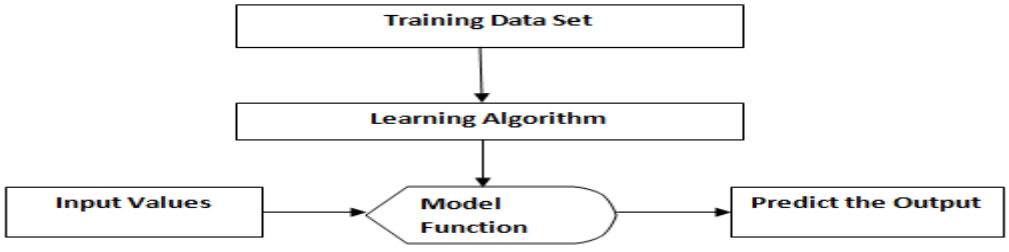


Figure 1. General Learning Algorithm

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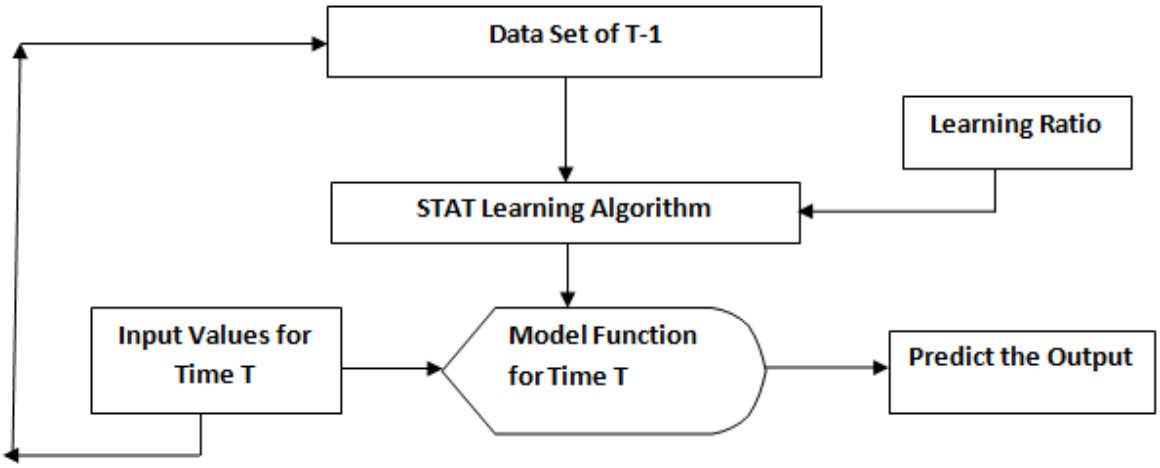



Figure 2. STAT Learning Algorithm

Pearson's correlation coefficient is the covariance of the two variables divided by the product of their standard deviations. The form of the definition involves a product moment, that is, the mean of the product of the mean-adjusted random variables; hence the modifier product-moment in the name. By mimicking the Pearson's co-relation, STAT algorithm will tweak the overall task performance with varying variables.

$$h\emptyset(x) = \alpha \times (\theta O + \theta 1 \times x) \quad (1)$$

$$\theta e = \alpha t * [\theta e - \alpha \times 1/m \Sigma \{h\theta(Xi) - Y(i)\}] \quad (2)$$

The above equation will determine the model function value with varying learning ratio. Varying learning ratio will result the machine to learn simultaneously, update the dataset, track the updated dataset and allowing machine to allocate necessary resource to perform new updated task by tweaking the current task T to its optimum level.

The below equation will determine the cost function for STAT algorithm which will determine the cost function until the function repeat till convergence. It contain past unit data-set with respect to time‘t’.

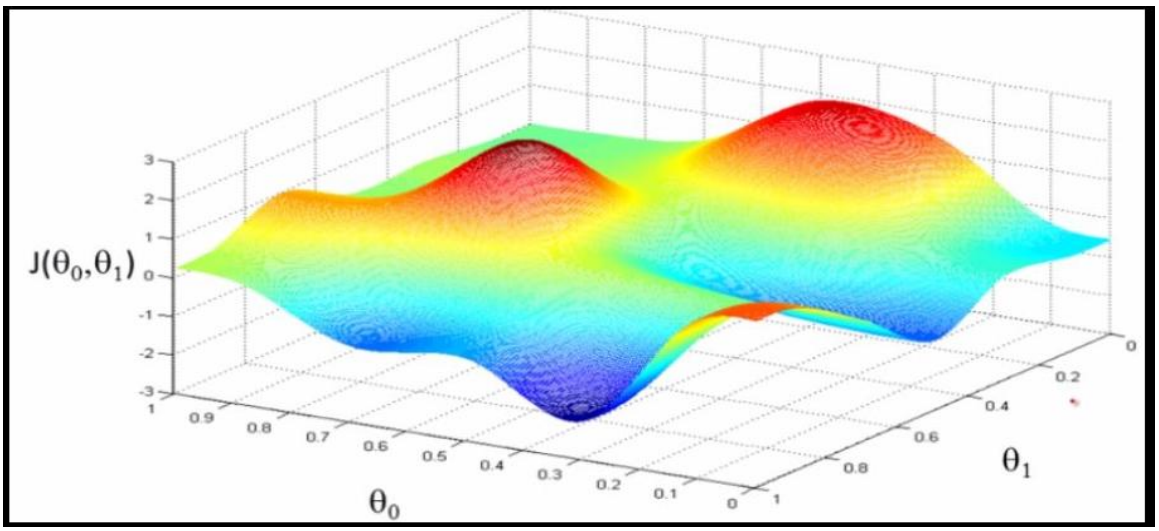
$$d/d\theta[j(\theta)] = \alpha * \{Xj * [ho(x) - y]\} \quad (3)$$

$$\theta j = \partial/\partial\theta j\,[\alpha(t-1)\{\theta j - \partial/\partial\theta j[\alpha(t) \times J(\theta e, \theta e+1)]\}] \quad (4)$$

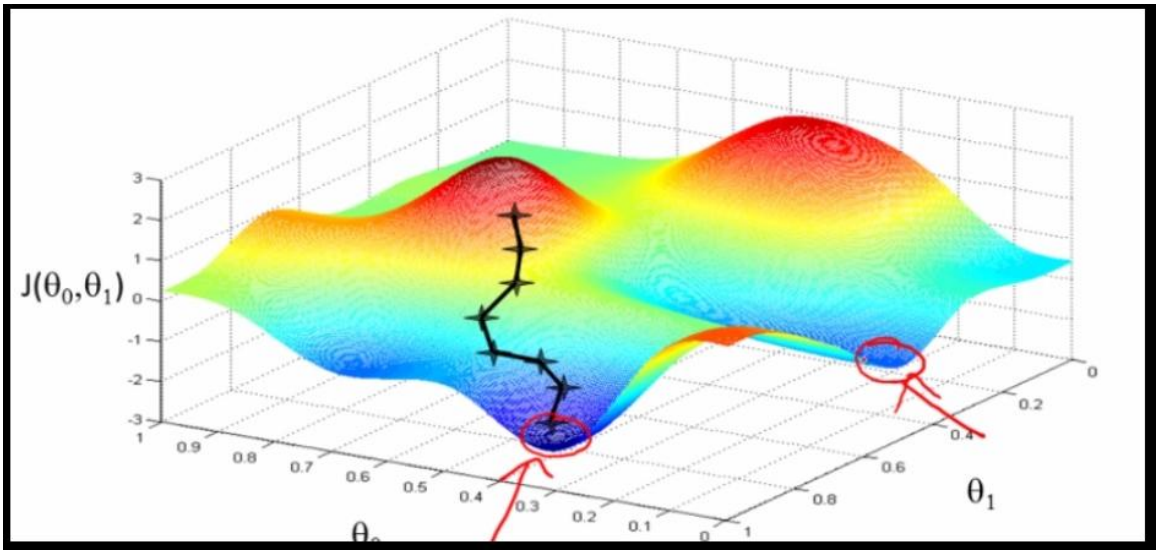
**3. EXPERIMENT AND RESULT**

The test set for this evaluation experiment is done for the 2GB DDR3 RAM with 980GTX graphics system. I used the pyCharm IDE for the programming purpose .I used the numpy package for certain data visualization purposes. This includes the following diagram as data-set for the data manipulation. For the experimentation purposes, I switched to R programming language in Rodeo IDE. I programmed some behavioral analogies in octave for the extreme data-visualization purposes.

The following diagram consists of the hills where a man needs to get down with very optimum path. The main challenge man is facing is that he can’t see the actual depth-peak of surrounding hills. So with his learning capacity α, he will draw the feasible paths from peak of the hill. As he tries to follow the most optimum path from the peak he will face more problems while getting down. During getting down he got to know that the path he predicted as optimum is infeasible in nature. The knowledge he gained from the peak point became diseased and again he need to learn the most optimum and safest path to get down.




(a)

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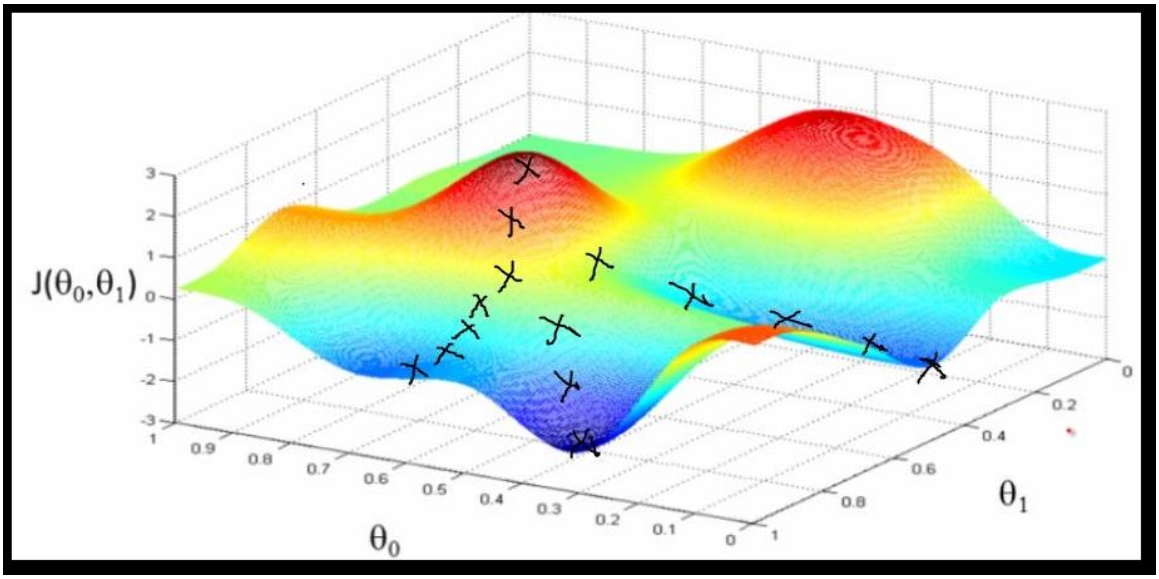
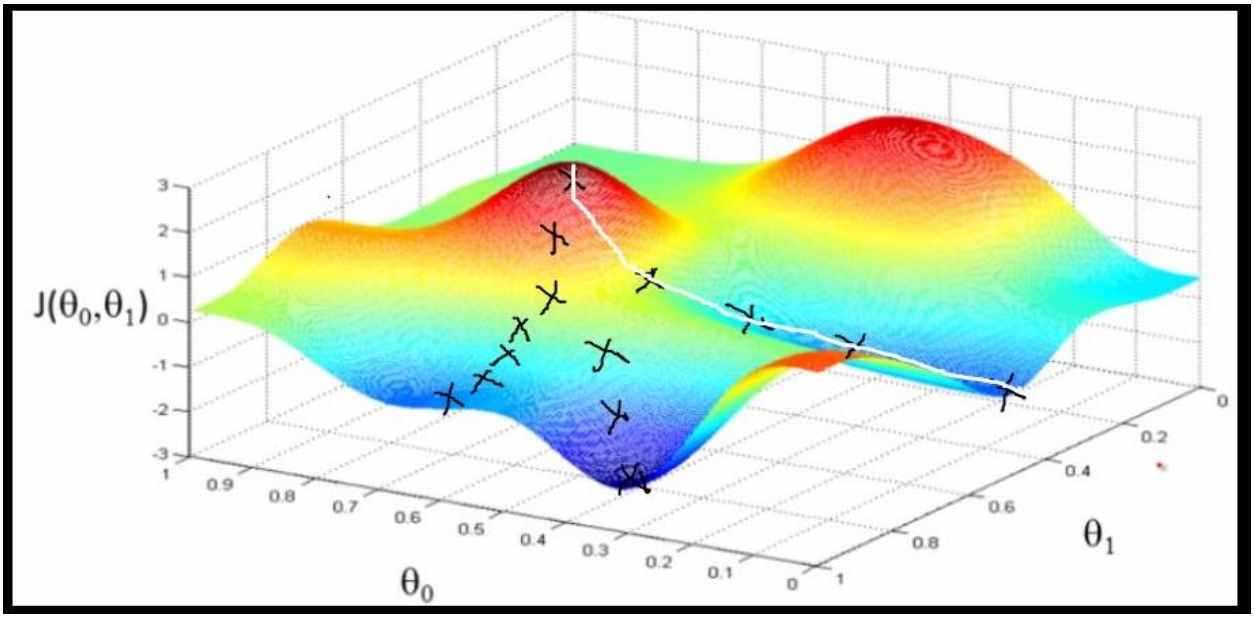



( c )




(d)

Figure 3. (a) Original Data-Set (b) STAT Algorithm at experience level 1(c) STAT Algorithm at experience level 2 (d) STAT Algorithm at experience level 3

Table -1 Experiment Result

| | Gradient Descent Algorithm | Simultaneous Track Allocate and Tweak Algorithm(STAT) | Algorithm Effectiveness towards the Data set(%) |
|---|---|---|---|
| Feasible Path for initial Dataset of experience 0 | 7 | 7 | 3.:3 |
| Feasible Path for initial Dataset of experience 1 | 4 | 3 | 5.42:7 |
| Feasible Path for initial Dataset of experience 2 | 2 | 1 | 8.56:9.68 |

Table 1 show the general algorithm shows multiple feasible paths but there is no guarantee of optimal results. Learning of general algorithm leads to the ambiguous results and sometime result to faulty results. It has the accuracy of 93% in the output. For STAT algorithm, table clearly states that STAT algorithm is more optimal as of 98% while gaining knowledge and performing task during different experience levels.

## 4. CONCLUSION

STAT algorithm can be used for dynamic learning at real-time scenario. This algorithm provides more specific constraints and helps the machine to understand the scenario not only based on the training set but also from the previously manipulated data of executing task. This algorithm can take also consideration of the external affects over the task performance. Since algorithm is learning dynamically it can cope up with the any kind of scenarios. STAT can learn, study the environmental behaviour and detect the factor which catalyses the performance in positive and negative ways. STAT algorithm can predict phenomenon output to more accurate and gives the more optimal result for any task considering the environment, behaviour and agents.

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