* + 1. **Machine learning**

Machine learning is a method of data analysis that automates analytical model building. Using algorithms that iteratively learn from data, machine learning allows computers to find hidden insights without being explicitly programmed where to look. (<https://www.sas.com/en_us/insights/analytics/machine-learning.html>) . Machine learning started evolving from pattern recognition and some theory that computer can understand and learn to perform specific task; researcher working on artificial intelligence wanted to see if computer actually could learn from data.

The goal is to understand the structure of the data – fit theoretical distributions to the data that are well understood. So, with statistical models there is a theory behind the model that is mathematically proven, but this requires that data meets certain strong assumptions too. Machine learning has developed based on the ability to use computers to probe the data for structure, even if we do not have a theory of what that structure looks like. The test for a machine learning model is a validation error on new data, not a theoretical test that proves a null hypothesis. Because machine learning often uses an iterative approach to learn from data, the learning can be easily automated. Passes are run through the data until a robust pattern is found. (<https://www.sas.com/en_us/insights/analytics/machine-learning.html#machine-learning-workings>)

Till today, traditional way of typing on computer keyboard has been upgraded with different technologies. This technologies come up with an idea that eliminates requirement of physical keyboard and become more user interactive. Human changes their habits as technology upgrades because it reduces human efforts and save time. Use of machine learning in such a field where technology adept human habits instead of human changes their habit for technology. That inspires me to make a gadget that learn human typing pattern and works as per their habit.

* + 1. **Decision tree**

Decision tree is decision support algorithm which uses branch and tree structure to portray possible outcomes. It constructs classification model in form of tree structure. Every node of a decision tree is divided into smaller subsets and design an associated decision tree with incremental development. Final tree carries tree nodes and decision nodes. One of the approaches to implement decision tree is ID3 algorithm.

Construction of decision tree follows top down approach from root node and imply classification of data into its subset that contain different values. ID3 algorithm uses entropy of attributes and collect information based on calculated entropy and target values. Why I thought of using this?

* + 1. **Markov chain Model**

Markov chain introduced by Andrew Markov, is an algorithm that calculates probabilistic model of system which changes system state over a time. Markov chain follows the principle of ‘Memoryless property’, a property of certain probability distributions. Using this model one can predict the probability of future states solely based on the current state instead of sequence of states. This nature of algorithm makes it easy to calculate conditional probability that is to be applied in numerous applications. Markov chain records previous state changes and calculate conditional probability transition matrix to predict future state transition probability. Markov chain provides run time training features. Algorithm can change transition probability at runtime based on current data input. This feature will help AIRtouch to get train from users while users are using it.

Why your own technique?

* + 1. **Selection of Algorithm**

Trees can be very non-robust. A small change in the training data can result in a big change in the tree, and thus a big change in final predictions, Decision-tree learners can create over-complex trees that do not generalize well from the training data.As decision tree is constructed based on entropy of attributes of a system, it is harder to update decision tree when the probability of any attribute changes in real time. This forces the system to reconstruct a decision tree every time the probability of any attribute changes. While Markov chain helps to overcome this redundant reconstruction activity and makes it faster by chaining particular probability only. That is why, we decided to use Markov chain model over the decision tree.

To use Markov chain process for my model, We need to compute finger – character probability and have to multiply with character transition matrix. After processing these multiplication, maximum probability by finger to character is my possible prediction. In my thesis I wanted to predict two parameters one is layer and one is character after predicting the layer. Instead of going with this complex theory and do trial and error, I created my own learning algorithm which is less complex and