**Project Proposal – Machine Learning  
Poker Rule Induction - Determine the poker hand of five playing cards**Pratik Rane – [psr280@nyu.edu](mailto:psr280@nyu.edu)  
Shivraj Patil – [srp468@nyu.edu](mailto:srp468@nyu.edu)

**Data set** : Data is available at <https://www.kaggle.com/c/poker-rule-induction/data>. It consists of 25,010 poker hands in train set, each hand consists of five cards with a given suit and rank, drawn from a standard deck of 52. A class label indicating the poker hand is associated with each record.

**Project idea :** The aim of the project as required by the Kaggle competition is to predict the poker hand given a random set of five cards from the standard deck of 52. The problem is easy if solved by coding the rules of finding the poker hand given five cards, but here we assume the system is not given the rules and it learns the rules by experience i.e., after trained using the training data set available. For instance, say we are given with the cards ♥6, ♣8, ♦7, ♦4, ♥5, our algorithm without the knowledge or checking if the given characters are sequential, it should predict the given input belong to the class of Straight.  
The crude idea that we have for the implementation of the project will be: using the neural network that uses backpropogation and gradient descent algorithm for training on the given data. The input layer of the network will be having 10 neurons (10 inputs each card is represented by two numbers – one of suit and another for card number). The number of hidden layers required, the number of neurons in the hidden layers need to be figured out such that the model will not underfit or overfit the data. The output layer will have 9 output- each indicating the probability of each of the classes the input belongs to.

**Software needed:** Python with neural net package

**Papers to read :   
-** Evolutionary Data Mining With Automatic Rule Generalization by ROBERT CATTRAL et al.  
- Better automated abstraction techniques for imperfect information games, with application to Texas Hold'em poker by Andrew Gilpin et al.  
- Computer poker: A review by Jonathan Rubin et al.

**Midterm milestone :   
-** The readings as listed in the paper to read section need to be completed  
- Concepts on neural networks need to be studied  
- Various experiemts need to be performed by using different configurations of neural nets which are cogent that will be opt for the data set that we have got