BIG DATA MINING, HW2, RESULTS

RORY FLYNN

Part 2

Deliverable 2.1: The equations for ϵ_{iu}. Update equations in the Stochastic Gradient Descent algorithm (2.a)(5 points). The equation for ϵ_{iu} in python is:

```
eiu = np.asscalar(2*(riu - np.dot(qu, pi.T)))
```

The equation for ϵ_{iu} in LaTeXis:

$$\epsilon_{iu} = 2(r_{iu} - q_u \cdot p_i^t)$$

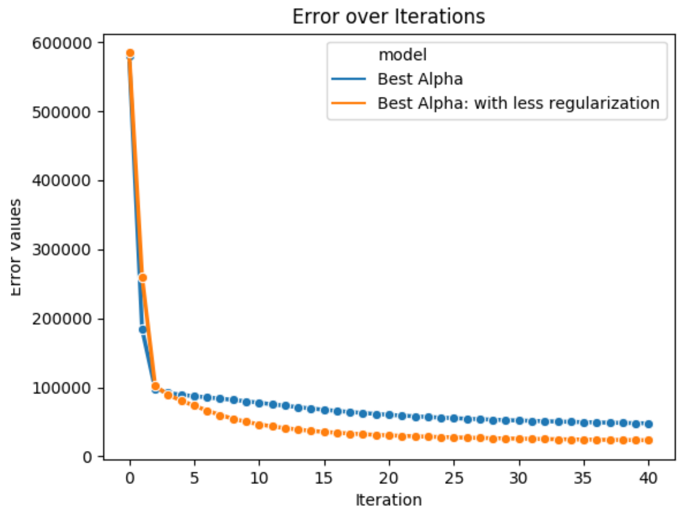
The equations for the updating in python is:

```
qi = qi + a*(exi*px - 2*l*qi)
px = px + a*(exi*qi - 2*l*px)
```

The equations for the update equations in LaTeXis:

$$q_u = q_u + \eta(\epsilon_{iu} \cdot p_i - 2\lambda \cdot q_u)$$
$$p_i = p_i + \eta(\epsilon_{iu} \cdot q_u - 2\lambda \cdot p_i)$$

Deliverable 2.2: What was the lowest error you got? What was the value of η? (5 points). The lowest error I got with 40 iterations and a regularization factor of 0.1 was 47975.05, with $\eta = 0.01$. When I also adjusted the regularization factor(λ), I got 23509.74, with $\eta = 0.01$, and $\lambda = 0.01$. The second value may constitute over-fitting however.



Deliverable 2.3: For the best η, plot of E vs. number of iterations. Make sure your graph has a y-axis so that we can read the value of E. (5 points).

Deliverable 2.4: The code as a Jupyter Notebook (.ipynb) or a .txt file. (35 points).
The code is in one txt file which will be submitted along with this document. It is used with a driver python file also included as a txt.