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Introduction to Cloud and Big Data Systems (Spring 2017)

Assignment 3

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1. Provide the code that you have developed to run the proposed problem in Spark.

Ans. Code included in the **codes.txt**.

2. Provide the output of the Spark code execution, which shows, for each iteration, the number of measurements filtered and missing values, for each α value.

Ans. For the following alpha values, the number of measurements filtered and missing values have been included in the below mentioned text files:

- (a) Alpha = 0.1; alpha1/outalpha1.txt
- (b) Alpha = 0.2; alpha2/outalpha2.txt
- (c) Alpha = 0.3; alpha3/outalpha3.txt
- (d) Alpha = 0.4; alpha4/outalpha4.txt

3. Generate a heat map (or similar) of the wind speeds in the 2-dimensional space. Provide in your submission at least the heat map of the first and last iteration, for each α value.

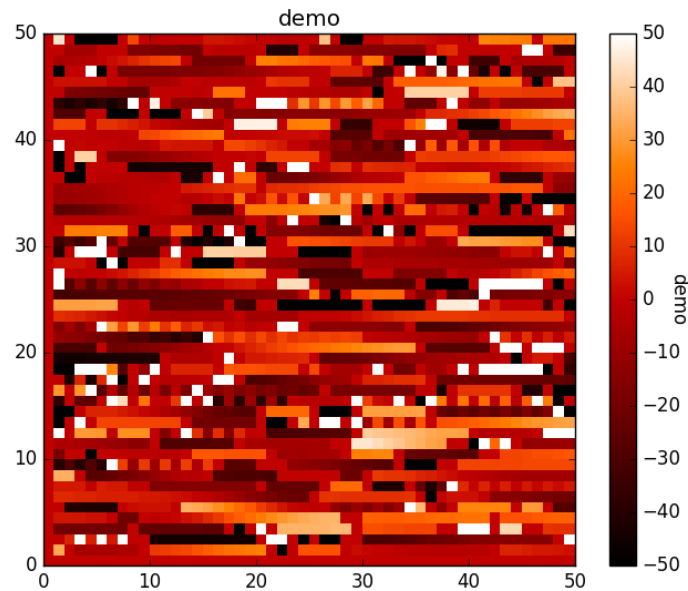


Figure 1: Alpha = 0.1 Iteration -> 49

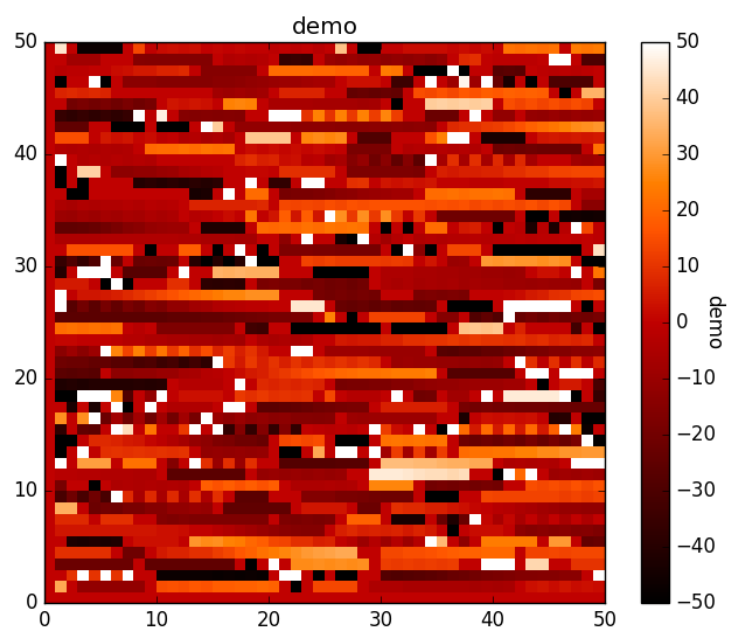


Figure 2: Alpha = 0.2 Iteration -> 49

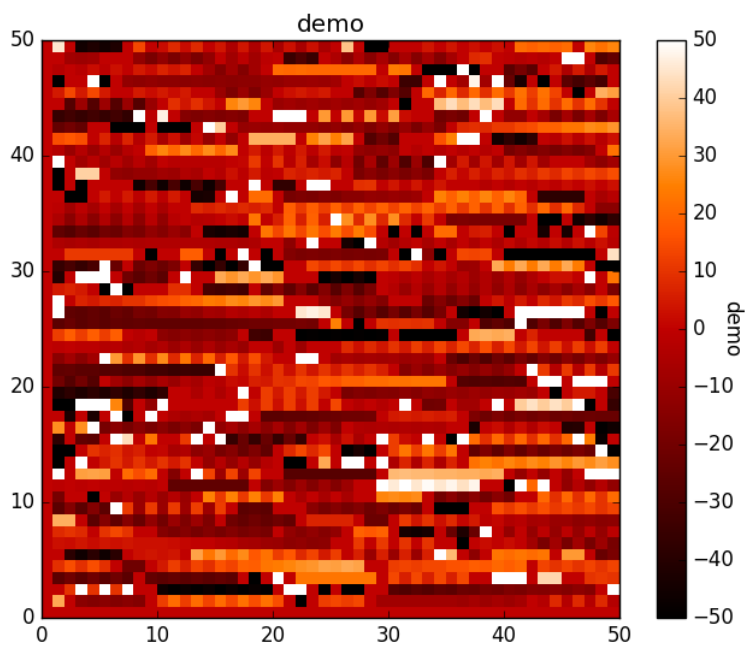


Figure 3: Alpha = 0.3 Iteration -> 49

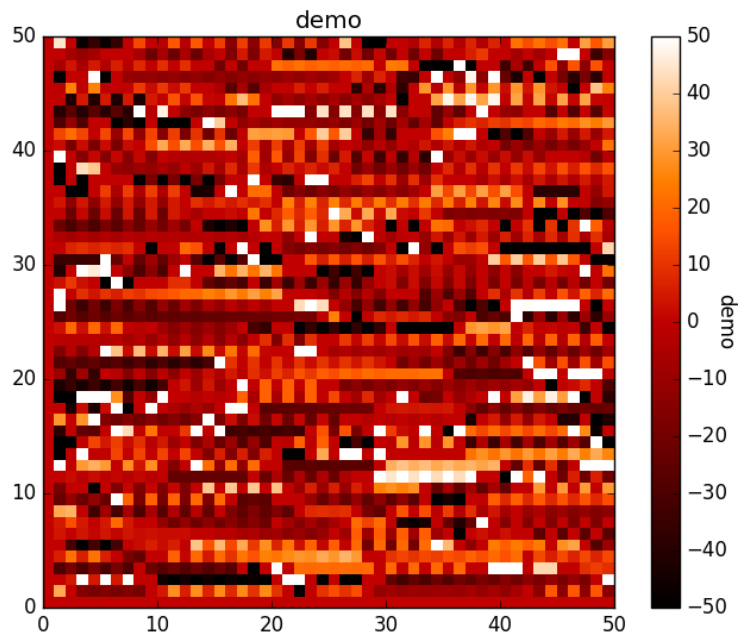


Figure 4: Alpha = 0.4 Iteration -> 49

(NOTE: All the heat maps for specific alpha values and its respective iterations are stored in the folders alpha1 ($\alpha=0.1$), alpha2 ($\alpha=0.2$), alpha3 ($\alpha=0.3$) and alpha4 ($\alpha=0.4$).

4. What is the impact of α value?

Ans. (a) It seems that increase in α value increases the z value. For instance, the z-value for $\alpha = 0.1$ is smaller than $\alpha=0.3$ or 0.4 . The α value only affects the *individual* z values in a direct proportion i.e. z value increases with increase in α value.

(b) However, based on observations done while iterating, it can be inferred that there's random impact on the z values; both in positive and negative direction. Thus, we can say that there's no direct proportion or relation of alpha values with the z magnitude when it comes to *multiple iterations*.

(c) Taking all these observations into consideration, we can say that increase in value of α increases the value of z whereas α values seem to have random impact on the iterations.

5. Optional (for extra credit): Provide an animated gif showing the wind speeds in the bi-dimensional space over the 100 iterations, for each α value.

Ans. For the following alpha values, animated gif showing the wind speeds in the bi-dimensional space over the 100 iterations have been shown in the below mentioned files:

- (a) Alpha = 0.1; Animated GIFS/**alpha1.gif**
- (b) Alpha = 0.2; Animated GIFS/**alpha2.gif**
- (c) Alpha = 0.3; Animated GIFS/**alpha3.gif**
- (d) Alpha = 0.4; Animated GIFS/**alpha4.gif**