Dissimilarity between Platforms

June 27, 2013

1 Definition of Dissimilarity

We suppose how the two platforms are similar to each other is also a measure to the diversity of the whole systems. If two platforms provide exactly the same set of services, then we could say that they are the same, and the *dissimilarity* between them is 0. Otherwise, if they provide completely different sets of services, the dissimilarity is ultimate, say 1. We try to avoid using *diversity* here because we have the feeling that merely the difference between platforms (or species) do not really mean diversity...

So the dissimilarity between a pair of platforms is defined as follows.

$$\mathsf{dissim}(p_1, p_2) = 1 - \frac{|p_1.ser \cap p_2.ser|}{|p_1.ser \cup p_2.ser|}$$

The dissimilarity of the whole system is the average dissimilarity of every pair of platforms.

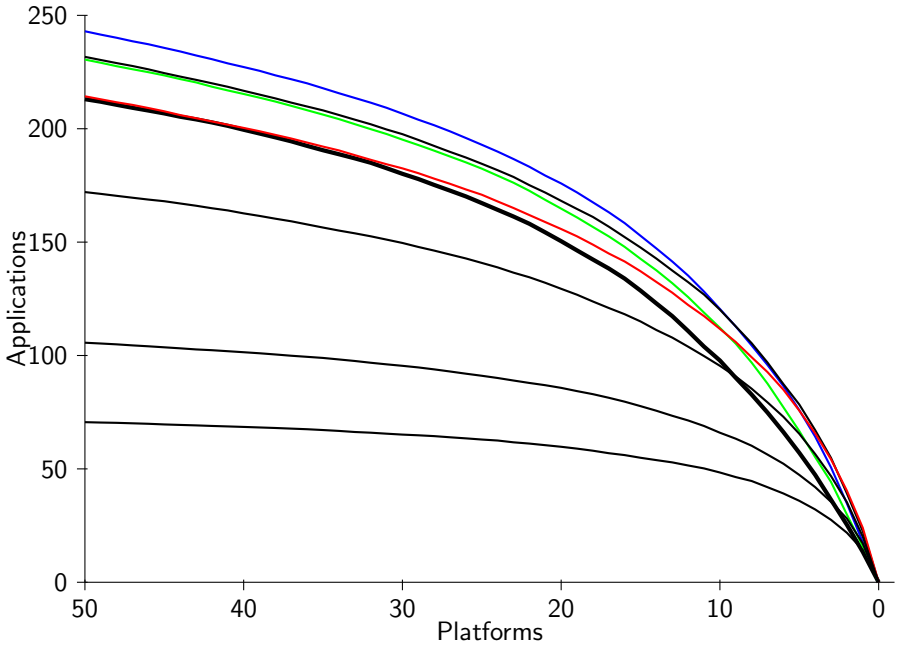
$$\mathsf{dissim}(P) = \frac{\sum_{p_1,p_2 \in P} \mathsf{dissim}(p_1, p_2)}{|P| * (|P| - 1)}$$

2 Experiment Design

Two experiments:

1. **Kill Platforms:** The original one to kill platforms one by one, and see how many applications left.

2. **Game of Life:** Suppose the platform may meet some failure and lose some of its services (10 %), but it has the ability to reboot this service, only after a short time period (0-10). An app dies if there is no platform to support it, and a platform dies after it has no application to support for a while (3). In such a configuration, a platform could act as another one's backup for a while, if they support the same application. The dissimilarities are between 0.5 and 0.7 .



3 Configuration

Two configurations.

1. **random:** Services are randomly distributed to each platform. The dissimilarity is quite high (0.92 - 0.95).
2. **mutated:** Randomly generate a number of seeds (3), and then each new platform is mutated from an existing one. It has a possibility to perform 0 to 3 times of mutation, each time to remove a service (10 %), add new one (15%), or change any of the existing one.

1. Base, dissims = 0.96
2. dep 100, dissims = 0.93
3. dep 238, dissims = 0.82
4. dep 300, dissims = 0.79
5. dep 400, dissims = 0.77
6. dep 500, dissims = 0.76

1. 500-¿0.9584

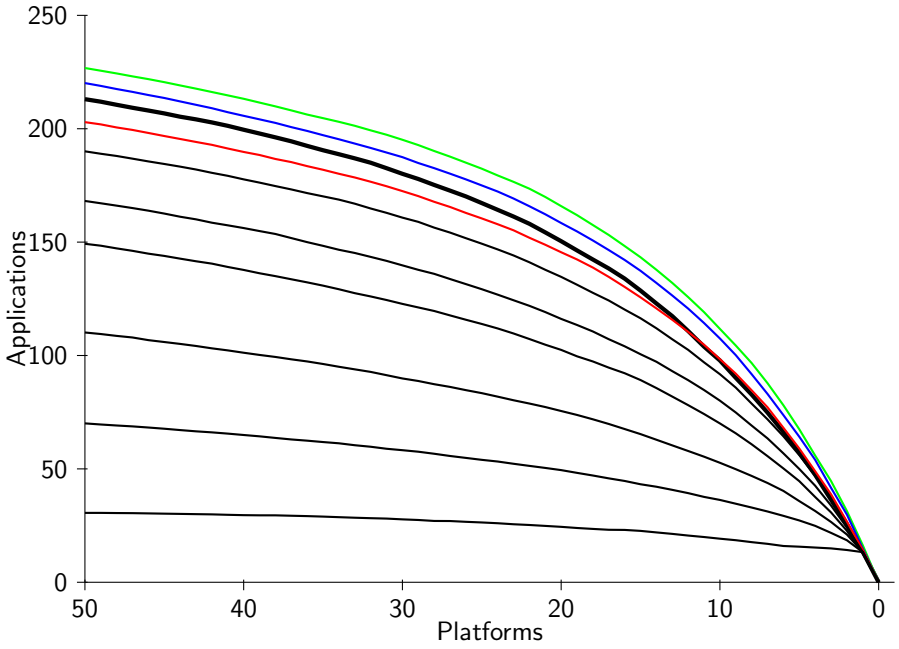
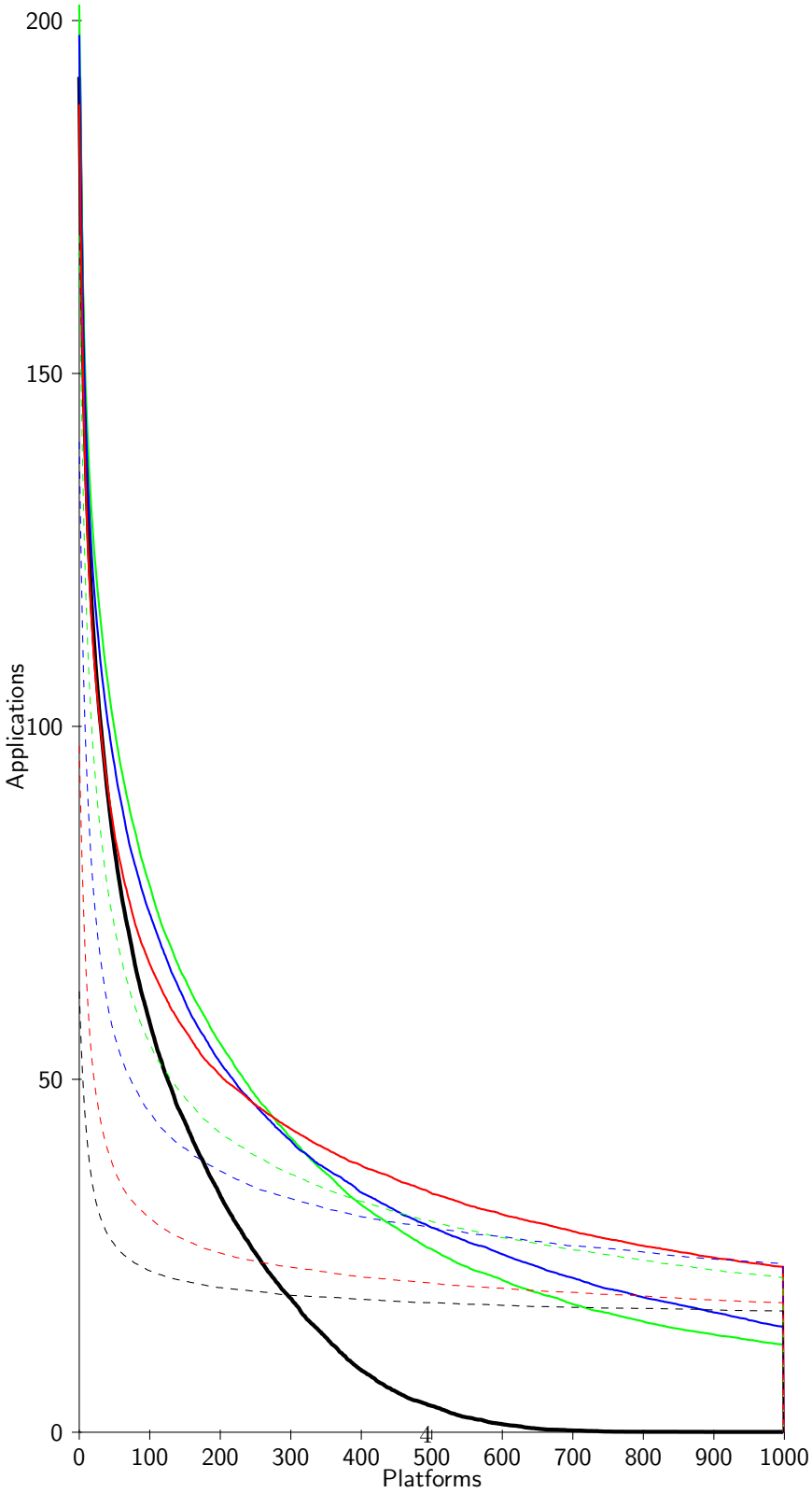


Figure 1: Platforms from mutation

2. 300-¿0.955
3. 100-¿0.952
4. 50 -¿0.944
5. 30 -¿0.917
6. 20 - 0.881
7. 10 - 0.763
8. 5 - 0.60
9. 1 - 0.26


200
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Applications
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Platforms