

obtained by taking the logarithms on both sides of Equation 2 to yield

$$\log(P(L)) = \frac{-3}{2} \log(L) - \lambda \cdot \frac{(L - \mu)^2}{2\mu^2 \cdot L} + \log\left(\sqrt{\frac{\lambda}{2\pi}}\right) \quad (3)$$

As a log-log plot, the equation presents as a straight line with a slope of approximately 3/2 for small values of L and large values of the variance. As L gets larger, the second term provides a downward correction. Thus, Equation 3 implies that, up to a constant given by the third term, the probability of finding a group surfing at a given level scales inversely in proportion to its depth $P(L)$. We verified this Pareto scaling by plotting the available data on a logarithmic scale; Figure 2 shows that the inverse proportionality holds over a range of depths. Although the graph in Figure 2 essentially shows a Pareto plot it can be viewed as a Zipf Distribution, Pareto, or Power Law, as all three can be considered to contain the same information but stated in different ways [3, 11]. A similar experiment in [7] found patterns similar to those demonstrated for WAP users, further strengthening the hypothesis that mobile Web and regular Web users browse the same way.

These results indicate that the surfing patterns of WAP portals reflect the same strong regularities found in Web surfing, and that the Universal Law of Web Surfing [2, 7] is also the Universal Law of Mobile Web Surfing. Even though WAP and Web both offer ostensibly different paradigms of information access, users tend to surf and browse for information in essentially the same way in both contexts.

This law demonstrates the regularity with which users surf the Web and is useful for predicting mobile behavior. For example, there should be attendant benefits to using this model to aid user surfing, bootstrapping intelligent systems that aid users surfing WAP pages [10] by aggressively promoting links to aid user navigation or prefetching pages to combat slow download times [8]. As outlined in [7], this law may also be used in conjunction with spreading activation to predict expected usage of WAP sites; that is, it may be possible to reorganize the structure of a WAP site to obtain a desired usage pattern by motivating the appropriate behaviors.

The Universal Law of Web Surfing [2, 7] has proved to be the Universal Law of Mobile Web Surfing, affording more tools to help overcome the shortcomings of the mobile Web and aid development of new and novel techniques in user navigation in the

mobile domain. These findings also augur well for understanding surfing in future 3G systems that will share similar device properties with WAP devices while offering more Web-like surfing opportunities to even casual cell phone users. **C**

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