Apple vs. Android: Signals of Succes in the Social Network

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***Abstract*—In this paper we measure and quantify how consumer's choice of smartphones are related to their peers' smartphone choices. Specifically, we study and compare this 'social component' of product adoption for two competing classes of smartphones: iPhone and Android. This is done by constructing a proxy of a social network by using anonymous phone log data from Norwegian mobile phone users, and then coupling adoption data to this social network. We find that smartphone adoption is dependent on the underlying social network both for Android and for iPhone users. Comparing the two, we see that the effect is strongest for the latter.**

Social Network Analysis;Viral Marketing; iPhone; Android; Telecom, product diffusion;success prediction

I. Method

Our social network is built by collecting anonymized call data records, aggregated over a 3-month period, and then using the communication links (voice and sms) as proxy for the social relationships. To remove error sources due to 'non-personal' relationships we have applied some filtering of the dataset. In total we end up with a network containing around 2.5 million nodes and 45 million edges.

We also use handset type data to associate a handset type with each node in the social network. With these data we can define the 'adoption network' – the social network among adopters **Error! Reference source not found.**. This is simply the sub network consisting of adopters and their common links. We can then study the development of the adoption network for iPhones (viewed as a single 'product') and for Android phones, over time (again making no distinction among the various models of Android phones). These same data allow us to measure conditional adoption probabilities between neighbors on the network, which we use as an indicator of social effects.

II. Results

In previous work, we looked at the growth of the iPhone adoption network over time, showing clearly the development of a 'social monster'—a giant connected component of the adoption network which shows the fastest growth. We equated the strength of this monster with the presence of iPhone adopters in the 'dense core' of highly central subscribers—a sign of success of the product in taking off. Presence in the dense core is also inevitably associated with a high density of adopter-adopter links—a sign that the product adoptions is 'social'. Here, in using the term 'social adoption', we do not attempt to distinguish homophily effects from true inter-customer influence: we simply seek to measure the tendency for those who talk together to adopt together.

In Figure 1, we compare the growth of the Apple adoption network with that of the Android adoption network, on a quarterly basis. In each case, we start with the quarter in which the 'product' was first launched. While we see no dramatic difference in the first–quarter picture (Fig 1(a)), it is clear that already, two quarters later (Fig 1(c)), the Apple 'monster' (Largest Connected Component - LCC) is growing much more rapidly than the Android monster. This holds not only for total

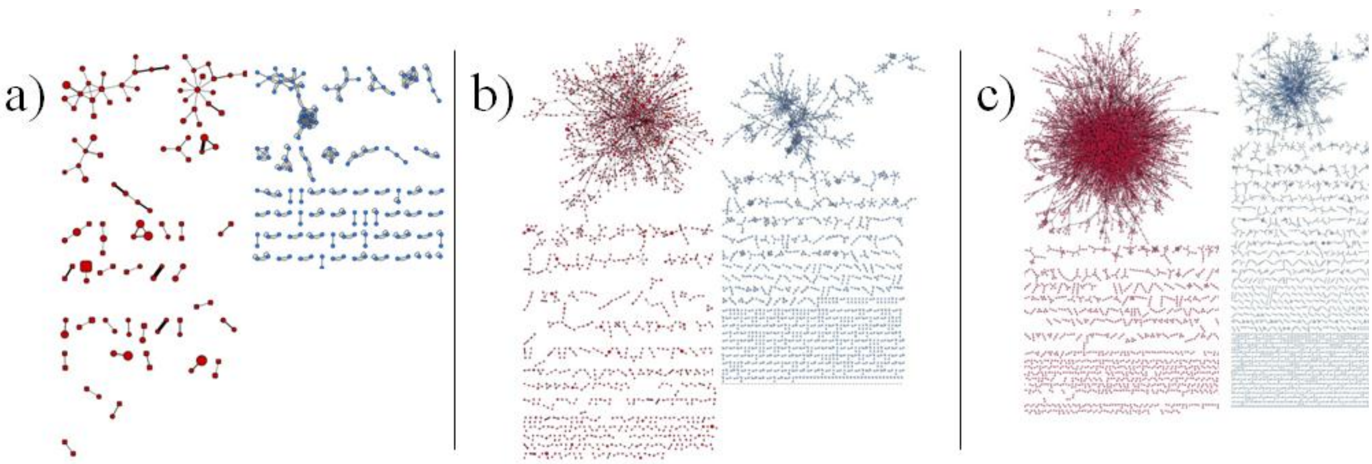

Figure 1

The figure shows the evolution of the iPhone (Red/Left) and Android (Blue/Right) adoption networks during the 3 first quarters after launch of the first respective brands. The nodes are customer with iPhone(red) and Android (blue). Links indicate communication between the nodes. Figure a) is the quarter when the handset first appears in the market, b) is the next quarter and c) is third quarter after product launch. Isolated nodes are not shown – i.e iPhone customers that do not know other iPhone buyers or Android Customers that do not call other Android customers will not appear in this visualization.

number of adopters in the LCC, but also in terms of their percentage of all adopters: two quarters after launch, the Apple LCC has ca 38% of all adopters, while the Android LCC has around 28%.

For another indicator of social adoption, we look at the number of inter-adopter links (adoption pairs) in each adoption network, over time. Figure 2 tracks the number of adoption pairs for each product, versus the total number of adopters. The black dotted curve in Figure 2 gives the number of adopter pairs expected, for the given total number of adopter pairs on the fixed call network, if adoption was purely random. We see that both products generate many times the number of adopter pairs expected from this random reference model. Thus, both products show significant social adoption—but, again, the effect is clearly weaker for Android. (The ratio between the empirical number of adopters, and that number found in the random reference model, was studied in Ref. **Error! Reference source not found.** and termed 'kappa'.)

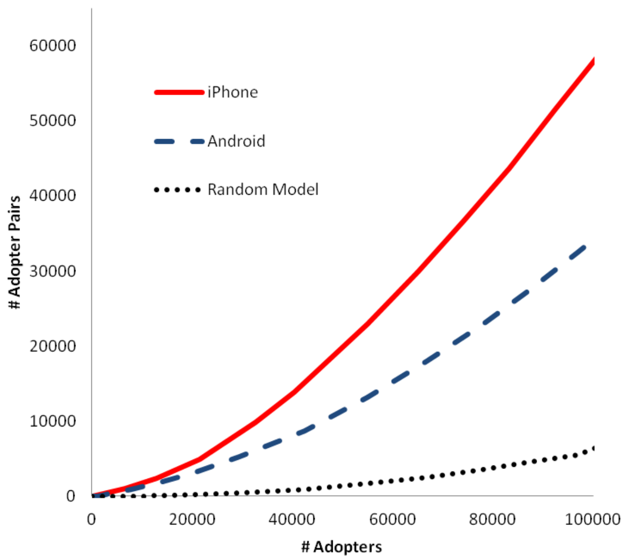

Figure 2
The plot shows the number of adoption pairs (Connected customers adopting same type of handset) vs. the total number of customers having the brand (x-axis). Red solid line is iPhone, blue stipled line is Android and black dotted line is the random simulation model.

In Figure 3 we plot yet another indicator of social adoption. Here we look at $p_X(k)$—the conditional probability that, given that a node has k neighbors adopting product X, the node in question has also adopted product X.

Since random adoption gives a flat $p_X(k)$, the positive slope of the results in Figure 3 are again taken as evidence for social effects (of some kind) in adoption—for both products. The difference between Apple and Android is seen here in that the Android curve has more weight at small k—flattening out at large k—while the Apple curve has less weight at small k, but grows steeply, and almost perfectly linearly, all the way to *k*=10. These data were taken in Q3/2011. In this period, the Apple and Android penetration were approximately equally (around 18% each). Hence we see that p(k) is *under*represented at small k (compared to the random case, ie, the flat line at p(k) = 18%), and *over*represented at large k, for both products—but the skew is greater for Apple than for Android. Taking this skew as an indicator of social adoption,

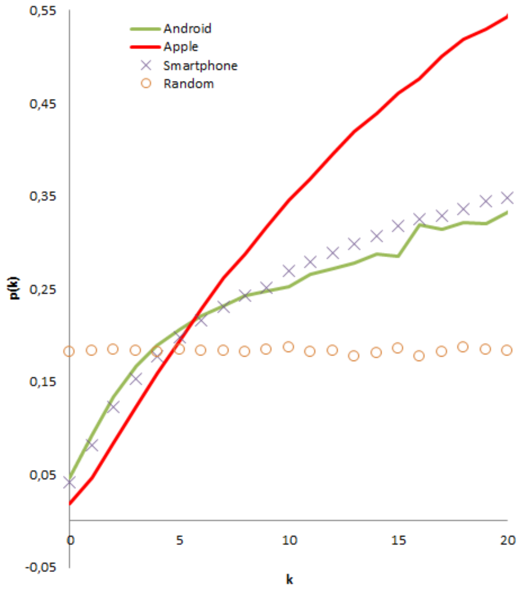

Figure 3
The plot shows ego's handset adoption probability given *k* number of alters with same handset. Red solid line is iPhone adoption probability and green is Android. Note that adoption probability increases strongly with the number of adopting peers. For comparison, we plot p(k) for a random reshuffling of iPhone users on the whole social graph(circles) and a random reshuffling of iPhone among all smartphone users (cross).

we find again that Apple is 'more social' than Android. The figure also shows the p(k) distribution when we randomly reshuffle the iPhone handsets among all smartphone users. We see that this line falls nicely on top of the real Android p(k) distribution. We interpret this as Android users are more indifferent to whether their peers use Android or iPhone, while there is a strong 'Tribe'-effect in the iPhone case – it's not just about having a smartphone, it must be an iPhone.

III. Future Work

We believe the study of peer adoption effects and the adoption network in early phases after product launch can be good indicators of product success or failure. Measuring how the dense core of adopters forms and develops can help us understand future adoption. We are now working further on developing such metrics and testing on real telco adoption data.

[1] Comparing and visualizing the social spreading of products on a large-scale social network. Pål Sundsøy, Johannes Bjelland, Kenth-Engø Monsen, Geoffrey Canright, Rich S. Ling. The influence on Technology on Social Network Analysis and Mining, Tanzel Ozyer et.al, Volume 6, Springer 2013, pp 201-225.