social network analysis and marketing

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CIS 677

marketing 101
“Many a small thing has been made large by the right kind of advertising.”

- Mark Twain

“The sole purpose of marketing is to sell more to more people, more often and at a higher price. There is no other reason to do it.”

- Sergio Zyman, executive behind New Coke
“The aim of marketing is to know and understand the customer so well the product or service fits him and sells itself.”

- Peter Drucker, author and “social ecologist”

“Marketing is what you do when your product is no good.”

- Edwin Land, founder of Polaroid
“No great marketing decisions have ever been made on quantitative data.”

- John Scully,
former CEO of Apple

marketing is...

- promoting a product or service
- building a brand
- selling a lifestyle
- creating desire for something (not needed?)
- differentiating your product from the competition
- ?
social networks = $

<table>
<thead>
<tr>
<th>RANK</th>
<th>Category</th>
<th>Share of Time June 2010</th>
<th>Share of Time June 2009</th>
<th>% Change in Share of Time</th>
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<tbody>
<tr>
<td>1</td>
<td>Social Networks</td>
<td>22.7%</td>
<td>15.8%</td>
<td>43%</td>
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<tr>
<td>2</td>
<td>Online Games</td>
<td>10.2%</td>
<td>9.3%</td>
<td>10%</td>
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<tr>
<td>3</td>
<td>E-mail</td>
<td>8.3%</td>
<td>11.5%</td>
<td>-28%</td>
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<td>4</td>
<td>Portals</td>
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<td>Instant Messaging</td>
<td>4.0%</td>
<td>4.7%</td>
<td>-15%</td>
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<tr>
<td>6</td>
<td>Videos/Movies**</td>
<td>3.9%</td>
<td>3.5%</td>
<td>12%</td>
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<td>Multi-category Entertainment</td>
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<td>-2%</td>
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<td>Other*</td>
<td>34.3%</td>
<td>37.3%</td>
<td>-8%</td>
</tr>
</tbody>
</table>

Source: Nielsen NetView – June 2009-June 2010

customer lifetime value

“...the expected profit from sales to that customer, over the lifetime of the relationship between the customer and the company.”

- Domingos, 2001
who to target?

cost of acquiring a customer

vs

$$ \text{customer will spend over lifetime} \quad (\text{CLV}) $$

simple!

find out who will spend the most money on your product, and market to them at the least cost

Do you understand your customers well enough to sell to them?
not so simple...

customers don’t just spend money...

they also influence other people!

how much influence?

source: http://www.buzzplant.com/site/surveys/
NOW who to target?

better...

NOW who to target?

better still!
network value of a customer

“... the expected increase in sales to others that results from marketing to that customer.”

- Domingos, 2001

how much influence?

is a well-connected person worth 5x ?
10x ?
50x ?
100x ?
how much influence?

a certain epinions user was worth

20,000

non-networked people,

according to one study*

* but didn't have 20,000 direct connections

how to identify?

social network analysis, of course!
one strategy

- find influential people and market to them, right?
- not so fast...

some influence is good

some influence is bad!
better strategy

find influential people who are likely to look favorably on your product or company, and market to them

SNA is just another tool
SMA != SMA

SMA - social media analytics

- monitoring of social media sites for mentions of products, brand, competitors
- follow discussions, identify issues and trends, shape conversations
- ascertain public tone and sentiment
SNA != SEM/SEO

SEM - search engine marketing
SEO - search engine optimization
- increase visibility in search results
- indirectly related to SNA, since PageRank uses eigenvector centrality
what can you do with SNA in marketing?

reach new customers

identify influential people, get them to adopt new products and spread the word
manage existing customers

- pay attention to customer sentiment
- be on the lookout for problems / bad publicity and mitigate ASAP
- market new services to existing customers

track ad campaigns

viral marketing - ideal for tracking through social media. How?
understand the competition

rival products, ad campaigns, news

how to apply SNA in ...
message boards

look for people who post a lot, and who have credibility and influence

- question people, discussion people, or answer people?
- not enough to look just at volume; have to examine what is being said

twitter

target people who
- have many followers - out-degree
- have important followers - eigenvector
- have favorable views of the product
12% - 20% of tweets mention a product or brand.

Are they saying good things? Bad? Asking for information?

What else are people talking about?
pages vs profiles

- pages are for businesses or organizations
- profiles are for people
- unlike profiles, becoming a fan of a page is non-reciprocal

recommendation systems

Facebook recommends new friends
+
Amazon recommends new products
=
Amazon recommends your friends’ products, on Facebook!
Domingos & Richardson, 2001

given a network of potential customers, how do you identify the best targets for marketing $\$ ?

- used datasets from epinions (product rating site) and EachMovie, a collaborative filtering (rating) system for movies
Domingos & Richardson, 2001

- model social networks as a Markov random field, with parameters for individual influence, connectivity, spend on each user, attitudes toward the product, etc.

- resulting model:

\[
P(X_i|X^k, Y, M) = \sum_{C(N_i)} P(X_i|N_i, Y, M) \prod_{x_j \in N_i} P(x_j|X^k, Y, M)
\]

Kempe et al, 2003

- followed up on work of Domingos & Richardson

- maximize the spread of influence in a social network with models that converge using different strategies
Kempe et al, 2003

- used dataset from co-authorships in physics publications
- authors who have collaborated multiple times have stronger edges

\[
g(x + a) - g(x) = \sum_u ((h_u(x + a) - h_u(x)) \cdot \sum_{A \in \mathcal{A}} (\sigma(A + u) - \sigma(A))) \cdot \prod_{j < u, j \in A} h_j(x + a) \cdot \prod_{j > u, j \notin A} (1 - h_j(x + a)) \cdot \prod_{j > u, j \notin A} h_j(x) \cdot \prod_{j > u, j \notin A} (1 - h_j(x)).
\]