Social analytics for mobile networks

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Mobile networks – the social aspect

- Mobile networks composed of underlying distinct social groups

- Available data – direct customer-to-customer interactions

- Yet not fully utilized in relevant mobile Business Intelligence (BI) applications

- Examples:

  - Churn prediction

  - Campaign management

  - Customer acquisition

  - …

Churn at mobile operators

BusinessWeek
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THE ASSOCIATED PRESS November 5, 2009, 4:28PM ET   text size: T

T-Mobile loses 77,000 customers in third quarter

- "Churning" = Moving to a competitor
- Account specific:

  - Prepaid churn: SIM change instead of renewal

  - Postpaid churn: Subscriber moves to another carrier, keep mobile number (public regulations)

- Mobile market: Mostly saturated, zero-sum game
- Gaining new business is much more expensive than retaining existing one

  - An order of magnitude more!

- Retention is usually achieved through outgoing call centers (and/or SMS), and at incoming call centers

Thursday, October 29, 2009 As of 8:51 PM (GMT +2 hours)
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Sprint Continues to Shed Customers

Different approaches to churn prediction

- **Goal: Predict potential churners as early as possible – easier, cheaper to retain**

- Traditional approaches:
  – Long-term: Analyze customer data to find patterns of churn
  – Short-term: Monitor call center, identify ad-hoc customers about to churn
  – **All traditional approaches treat customers as individuals**

- However:
  – Churn has a strong social aspect to it
  – Not captured by individual models

The challenge

- Predict customer churn:

  - Input: customer associated data

    - In our case – only 2 weeks of customer calls

  - Predict customer churn in next 3 (!) months

- Measure of success – **Lift**:

  - Customer service can only contact limited number of customers

  - Goal: Improve targeting of customers likely to churn

  - **Lift**: Number of churners according to model / number of churners in subset of the population
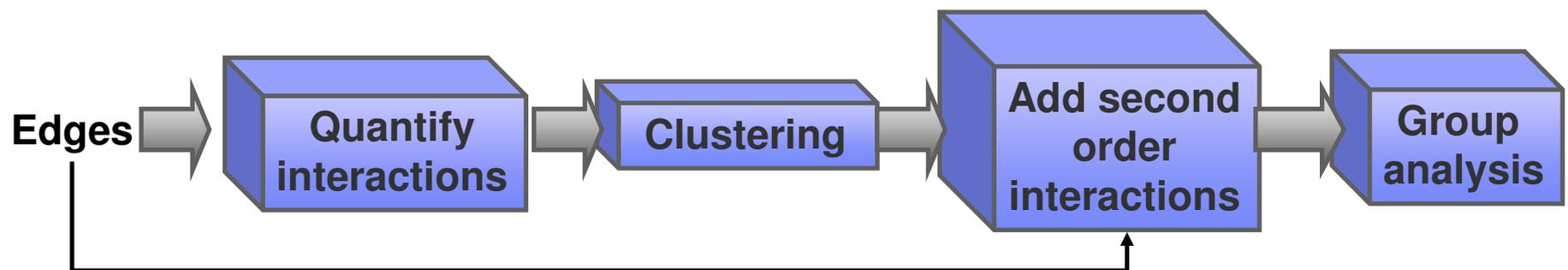
The basic premise: Churn is a social activity

- **Brian**: Please, please, please. Listen. I've got one or two things to say.
- **Crowd**: Tell us, tell us both of them.
- **Brian**: Look, you've got it all wrong! You don't need to follow me, you don't need to follow anybody! You've got to think for yourselves! You're all individuals!
- **Crowd**: Yes! We're all individuals!
- **Brian**: You're all different!
- **Crowd**: Yes, we are all different!
- **Man in Crowd**: I'm not.

Constructing social reference groups

- Quantify links between people

- Partition according to strongest links

- Link "stragglers"

- Analyze each group

Edges → **Quantify interactions** → **Clustering** → **Add second order interactions** → **Group analysis**

Step 1: Quantify links between people

People are friends
when they:

		Subscriber Y	
		Uncalled	**Called**
Subscriber X	**Uncalled**		
	Called		

Mutual information: $I(X;Y) = \sum_Y \sum_X p(x,y) \log\left(\dfrac{p(x,y)}{p(x)\,p(y)}\right)$

Step 1: Quantify links between people
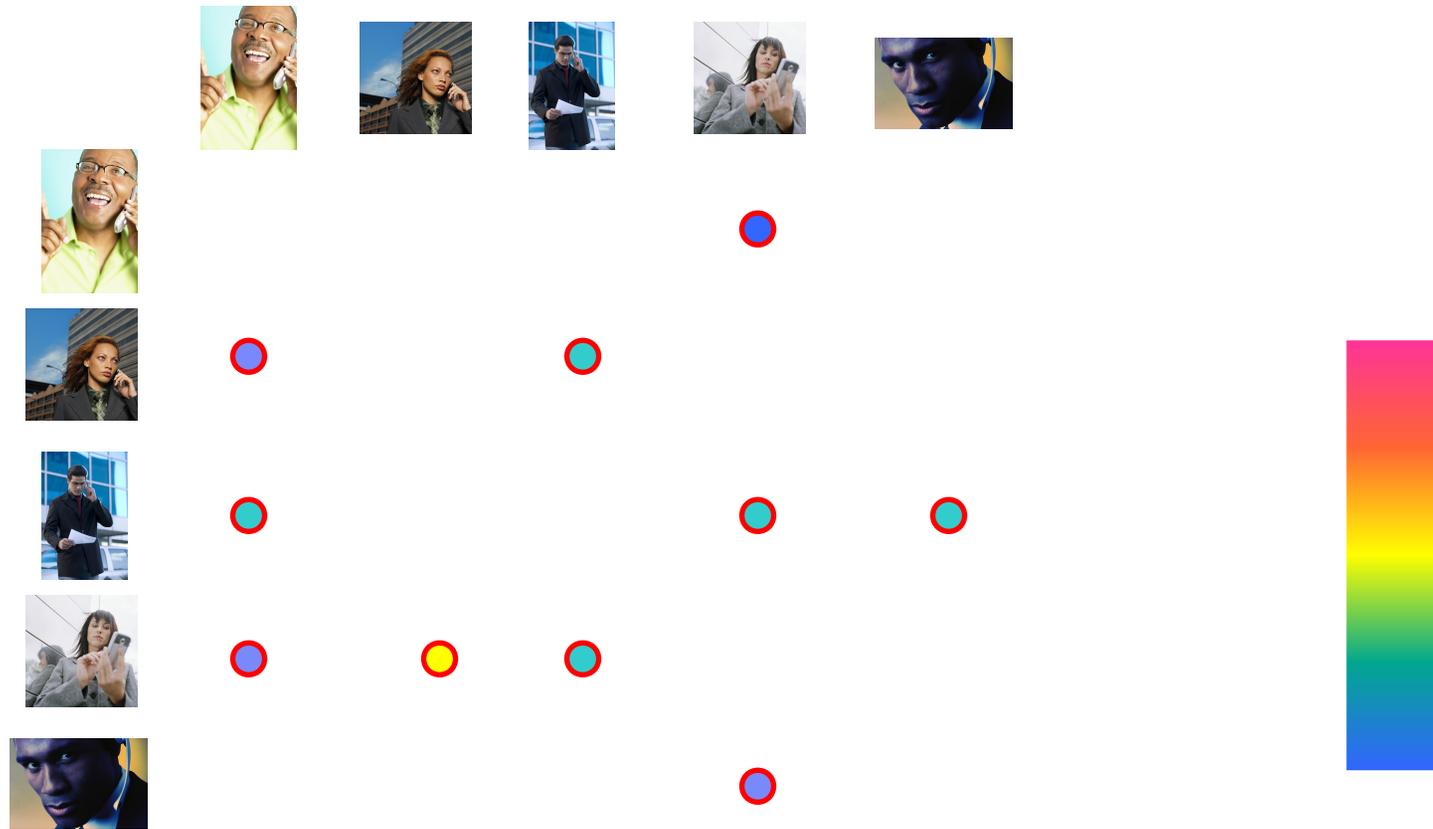
Step 2: Clustering
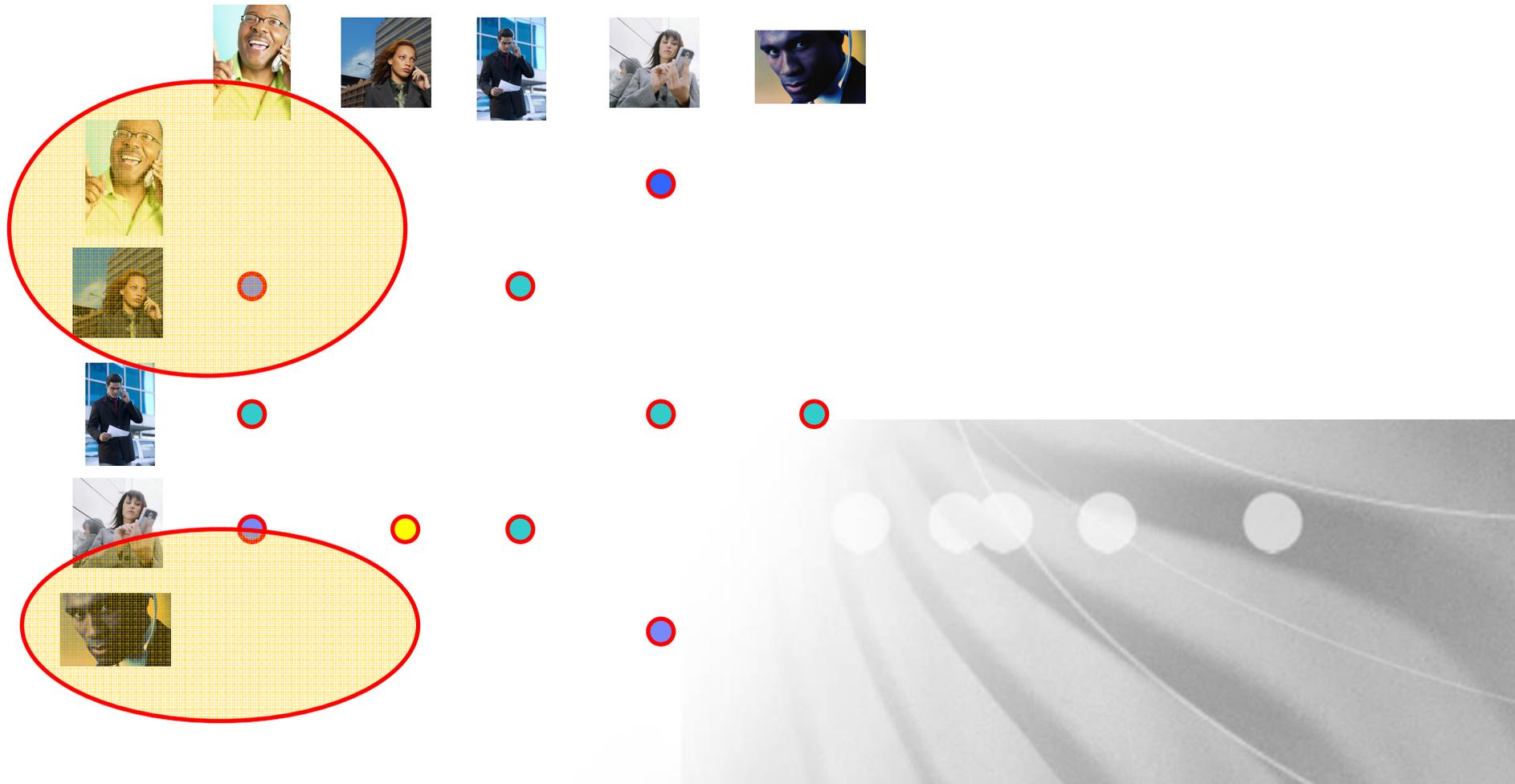
# Step 4: Deduce the leader of the group

He's also important
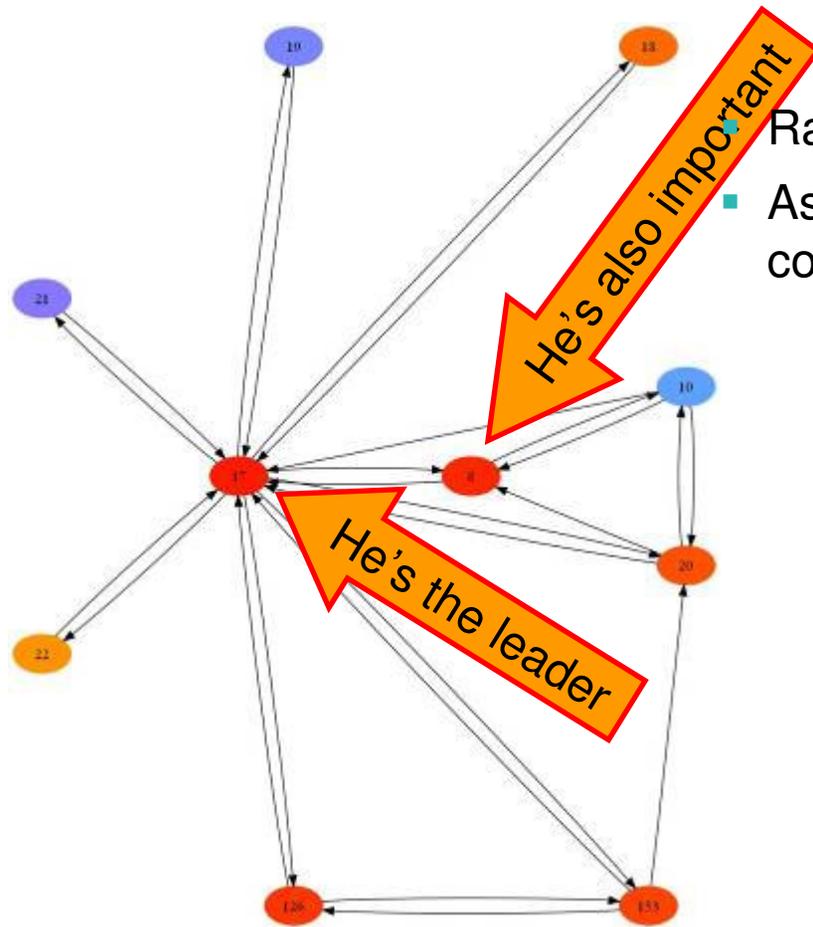
He's the leader

Random walk with restarts

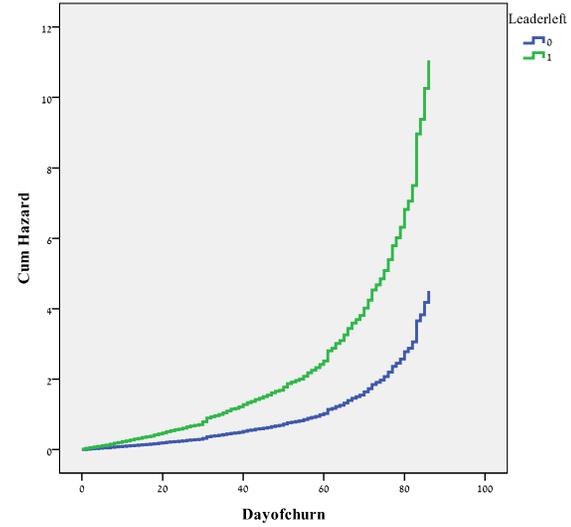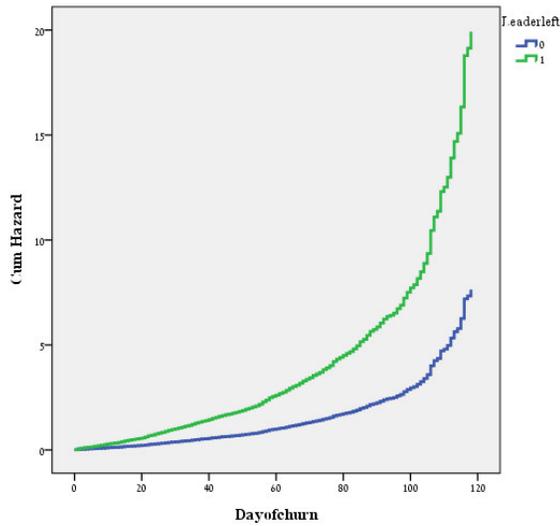- Assign each member corresponding probability
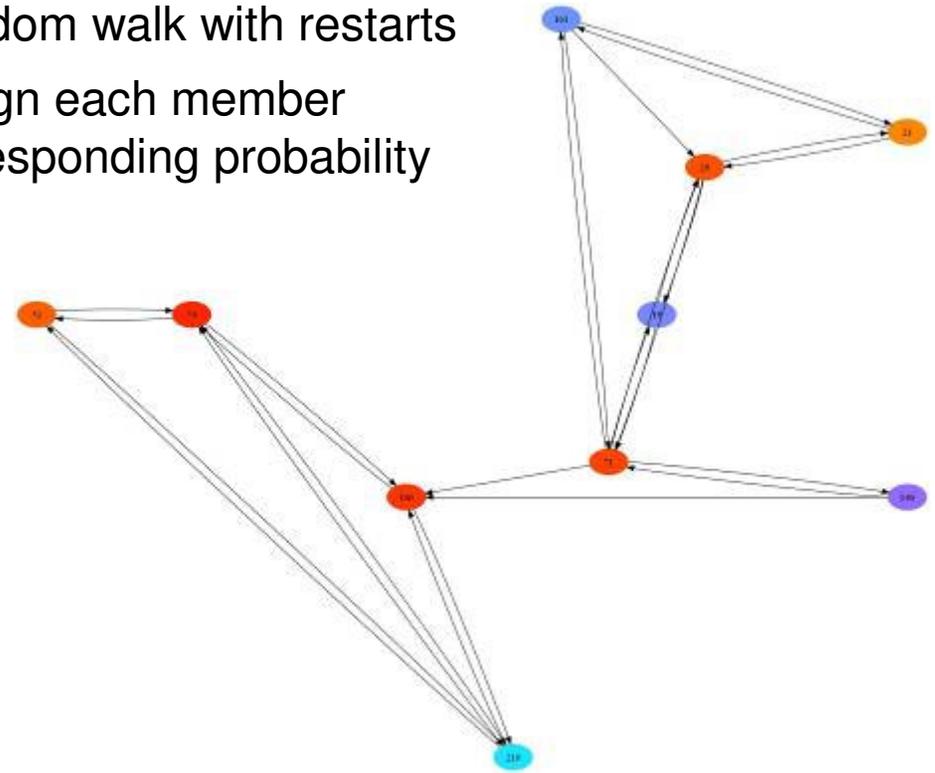
Group with no leader

Leaders as agents of change (churn)

- Most groups have a leader
- In 87% of groups, the leader is from the carrier
- Leader **not from carrier** - group churn likelihood grows **2.2** times.
- Leader **from carrier** - **10.6** times more likely to leave
- Leader from carrier, and leaves:
    - Another churner **2.4** times more likely
    - More than one churner **6.7** times more likely
  (compared when leader doesn't leave)
- **Early adopters** - churn earlier
- **Opinion leaders** - determine (92% certainty) the carrier of choice for their group members
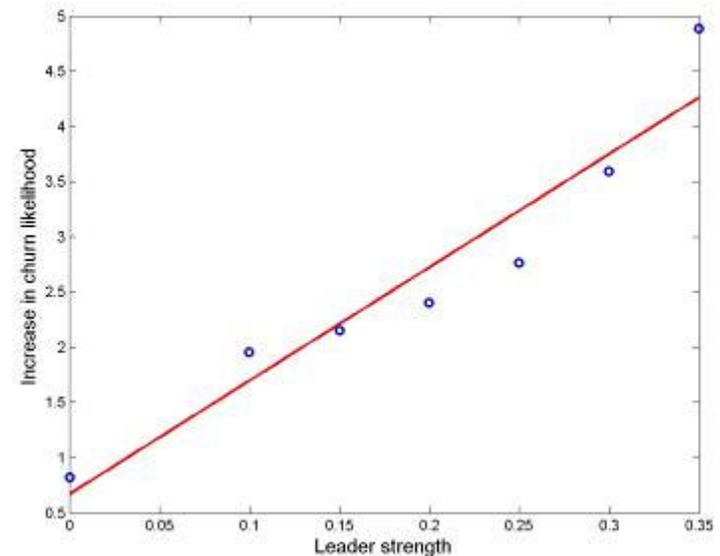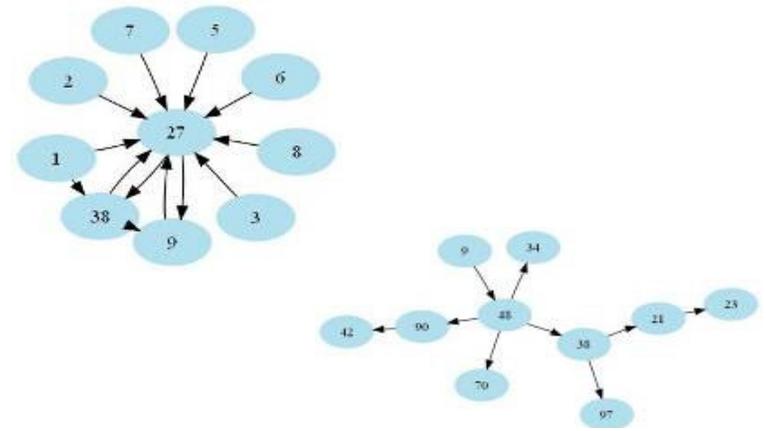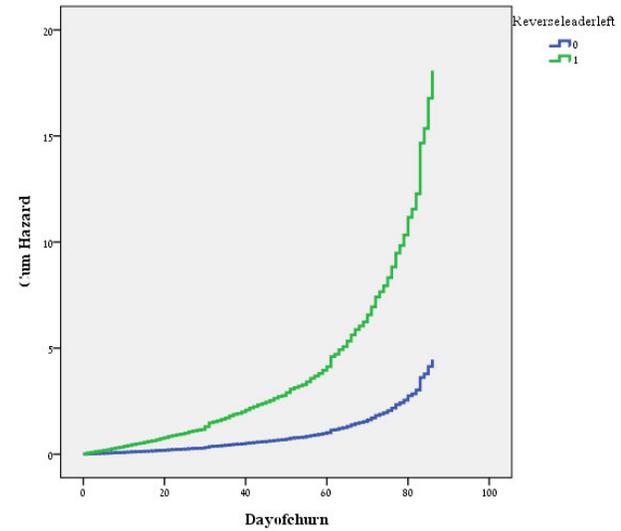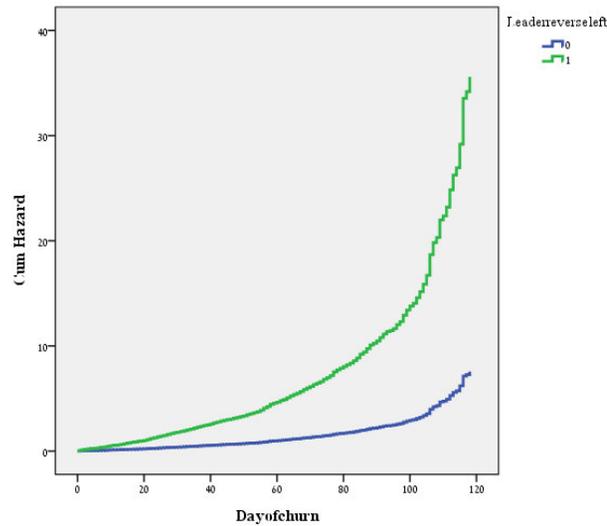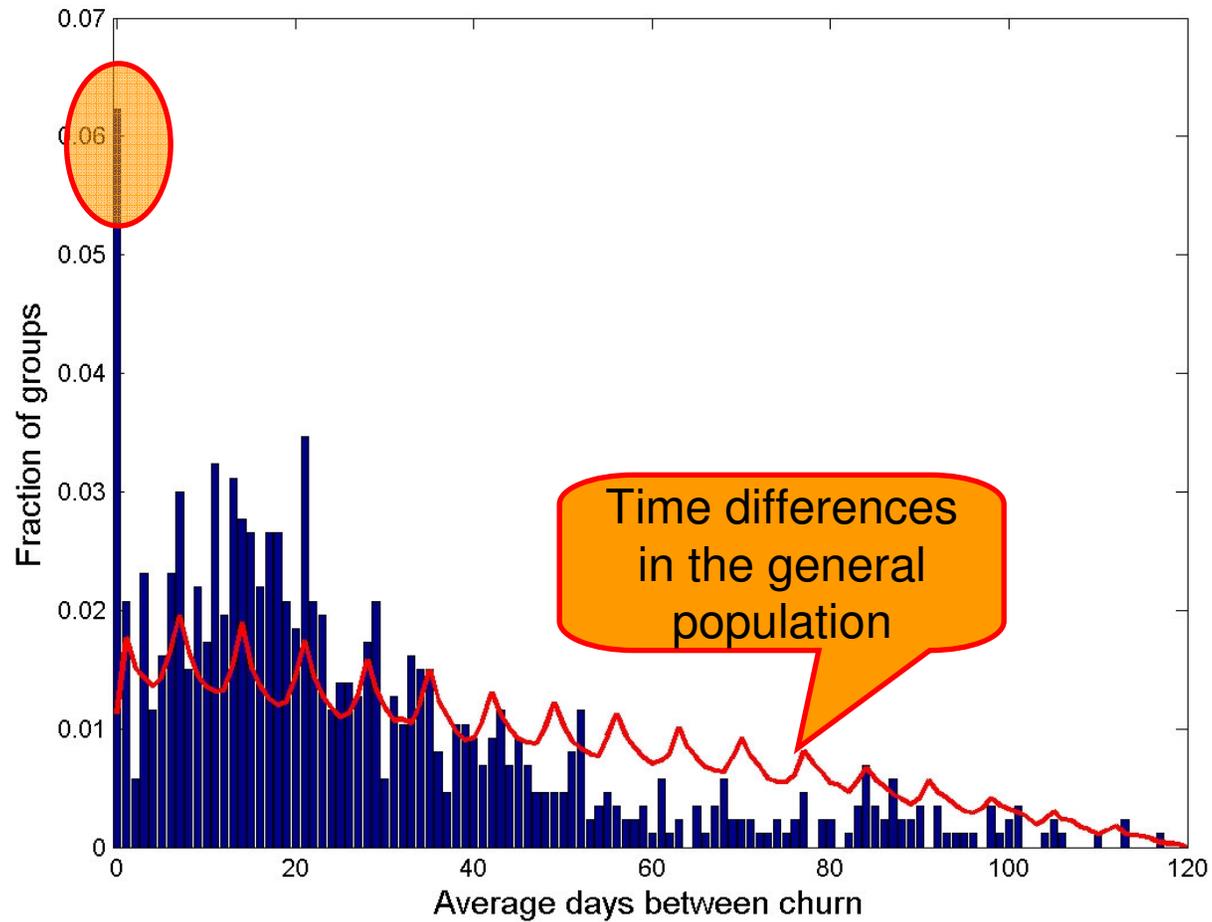
Cumulative hazard models

People churn with their group members

# Translating social insights into BI applications

- Extract social groups features

- Group prediction (eg, for churn)

- Group members prediction (eg, for churn)

1. Number of group members
2. Number of group members who are subscribers of the analyzed provider
3. Maximal (minimal) social strength in the group
4. Number of calls made (received) by the leader
5. Average number of calls made (received) by group members

Groups → **Extract group features** → **Group statistical model** → **Group members statistical model**
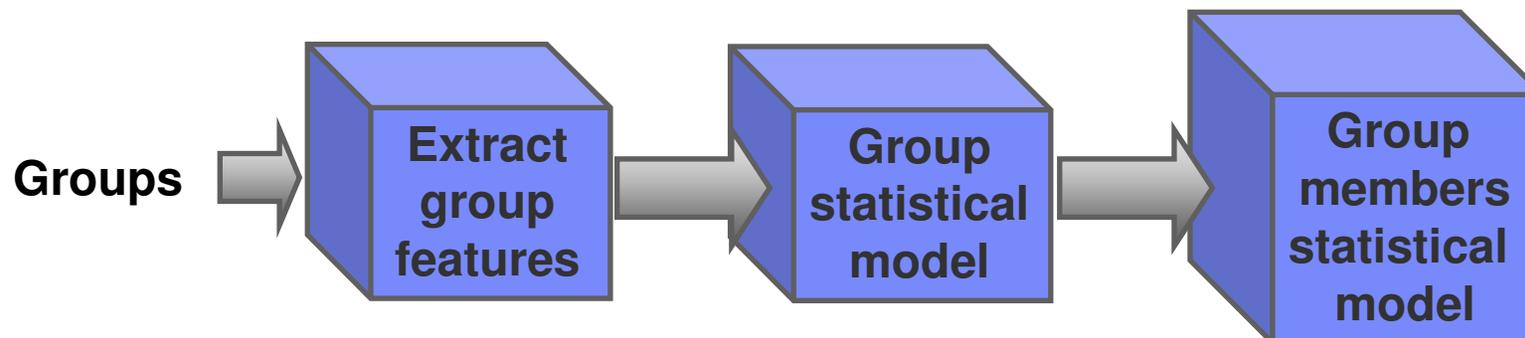
Test case 1 – augmenting existing model

- Long term (3 month) churn prediction based on 2 weeks calls data

- Segment: high-value private post-paid customers

- IBM SA model combined with existing
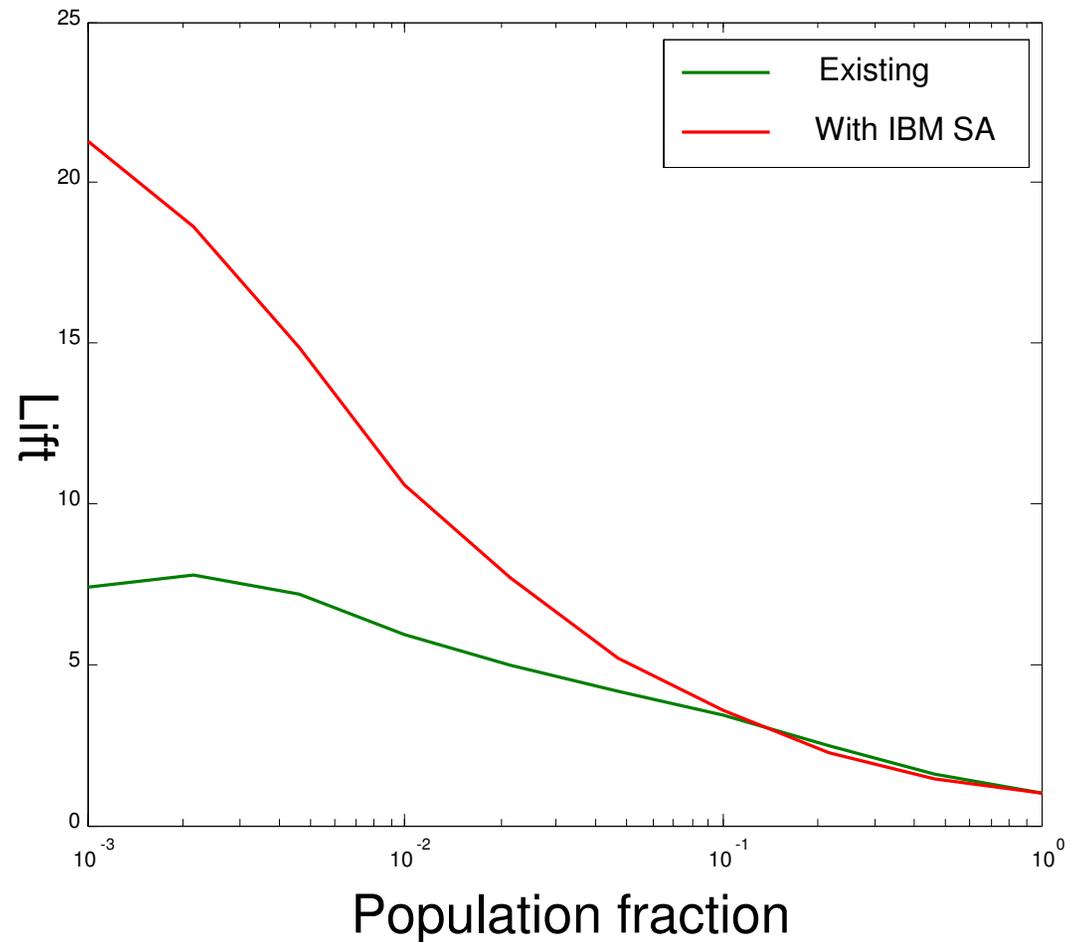
General group characterization

Groups in danger of churn

- Members are making few calls outside of the group

- Group is very active

- Leader is very active

Groups not in danger of churn

- Group is not highly active

- Leader is strong

- Leader rarely operates outside of his group

- Group is also active to the outside world

Test case 2 – pre-paid churn prediction

- Mostly pre-paid customers

- Short term (2-3 weeks) churn prediction

- IBM SA model alone

- Different coverage levels
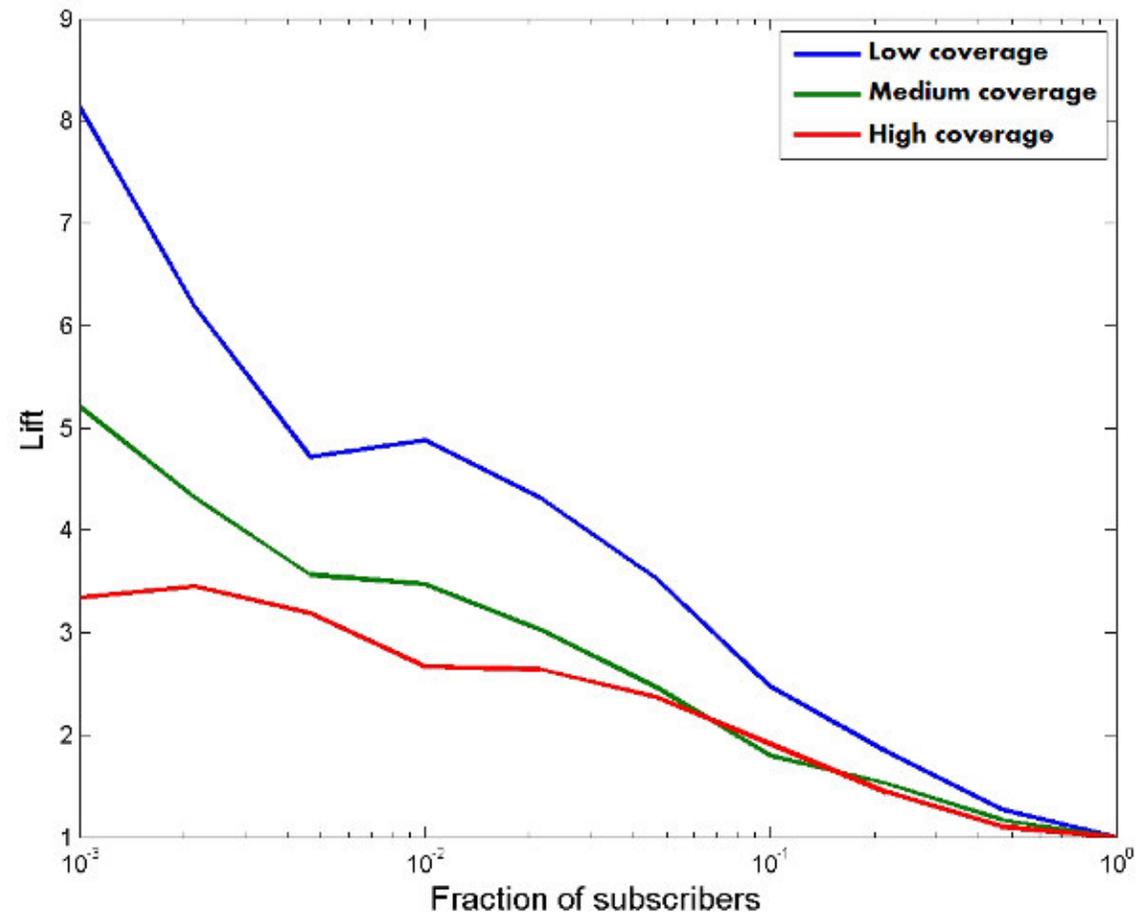
Test case 3 – customer acquisition

- Focus on applicability to customer acquisition

- Leaders have major effect when recruited:

  - Easier to recruit

  - Additional customers follows them

  - Reduce churn
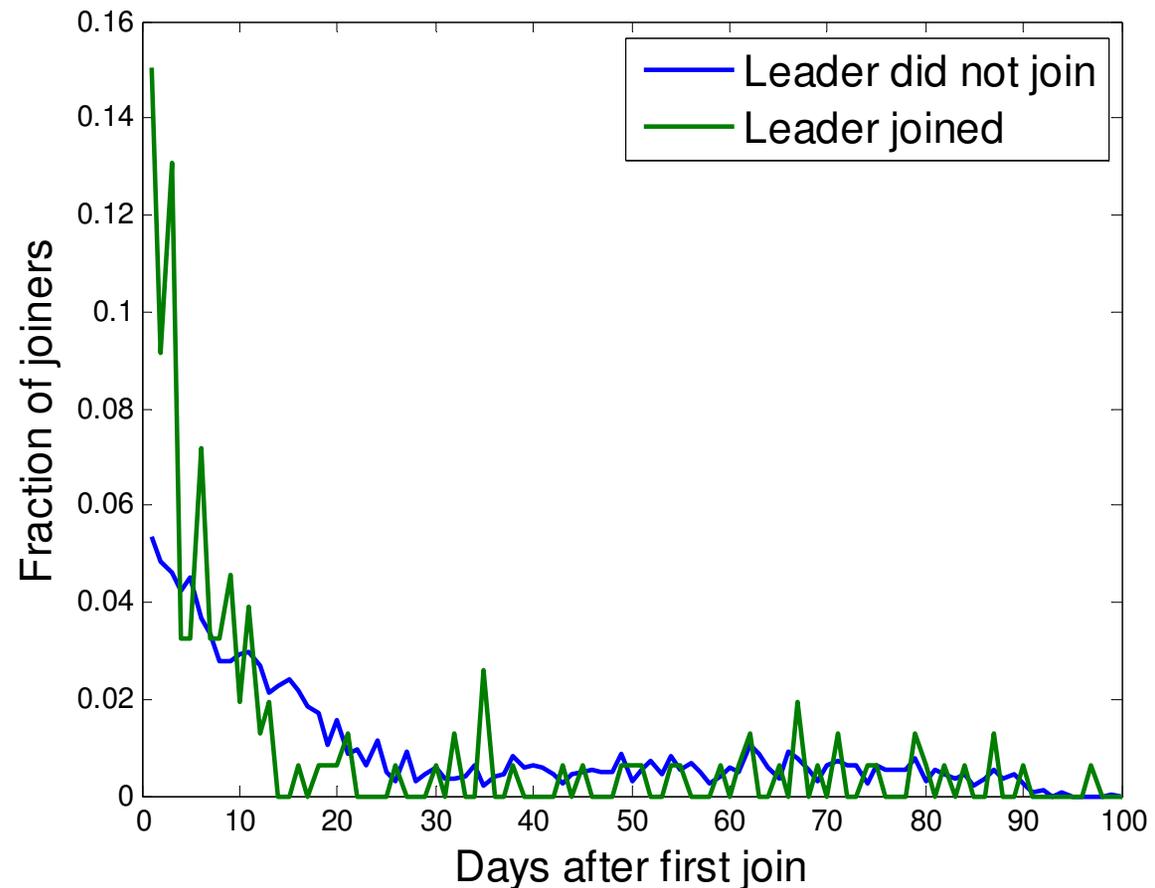
Test case 4 – churn analysis

- IBM SA churn analysis

- Similar results:

  – Strong correlation between leaders and churn

  – Group leaders are stable over time

  – Leaders should be targeted for churn prevention and campaign
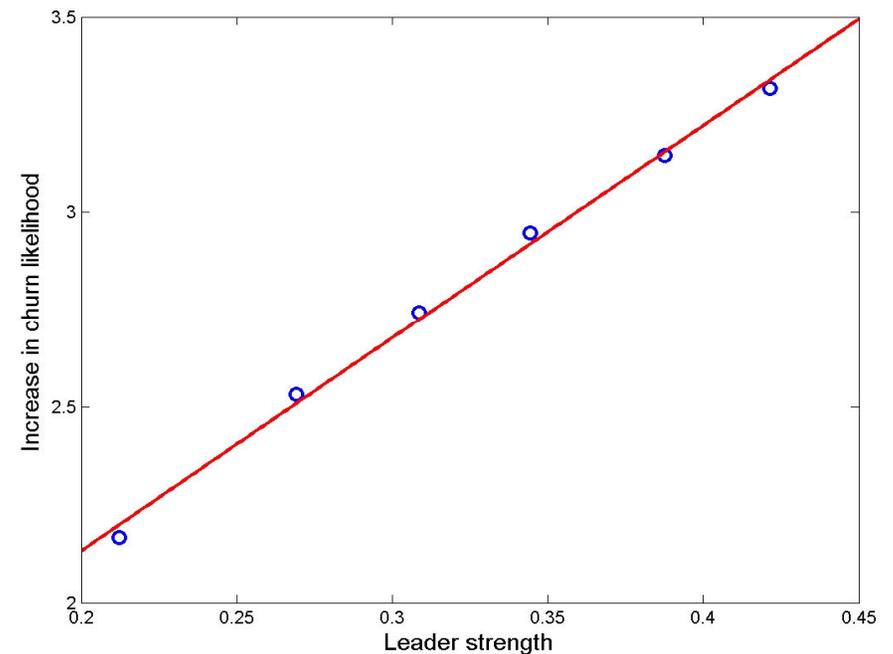
Summary

- Churn has social aspects

- Our methodology allows

  - Social analysis of disjoint social groups

  - Easy integration with statistical analysis (eg, prediction)

  - Modular approach

  - Can be combined with existing solutions

- Future directions

  - Additional applications

  - Experiment/combine with other heuristics