USE CASE :

Reduction of Marketing Campaign Costs by using an Optimized Link Analysis Model.

Think Big, Think Smart

SMART Data Analytics

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Business Challenges/Opportunities?

- Optimal Campaign Segmentation
- Link: Strength & Number of Relationships and Customer Spendings
- Relationship: Size of Networks and Neighborhood-Types
- Big Spenders with Big Spenders or Not?

Business Problem Statement

Client:

One of the major Telecommunication Providers in Senegal

Goal:

Improve the efficiency of Promotional Spend via the Loyalty Program

Data Exploration

Summary

- Data on 9.628 customers
- Total spend per customer in year 2014 – This data was scaled for confidentiality reasons
- Customers located in 26 sites of Senegal
- 6.655 Identified relationships between customers in form of frequency of calls in the year 2014

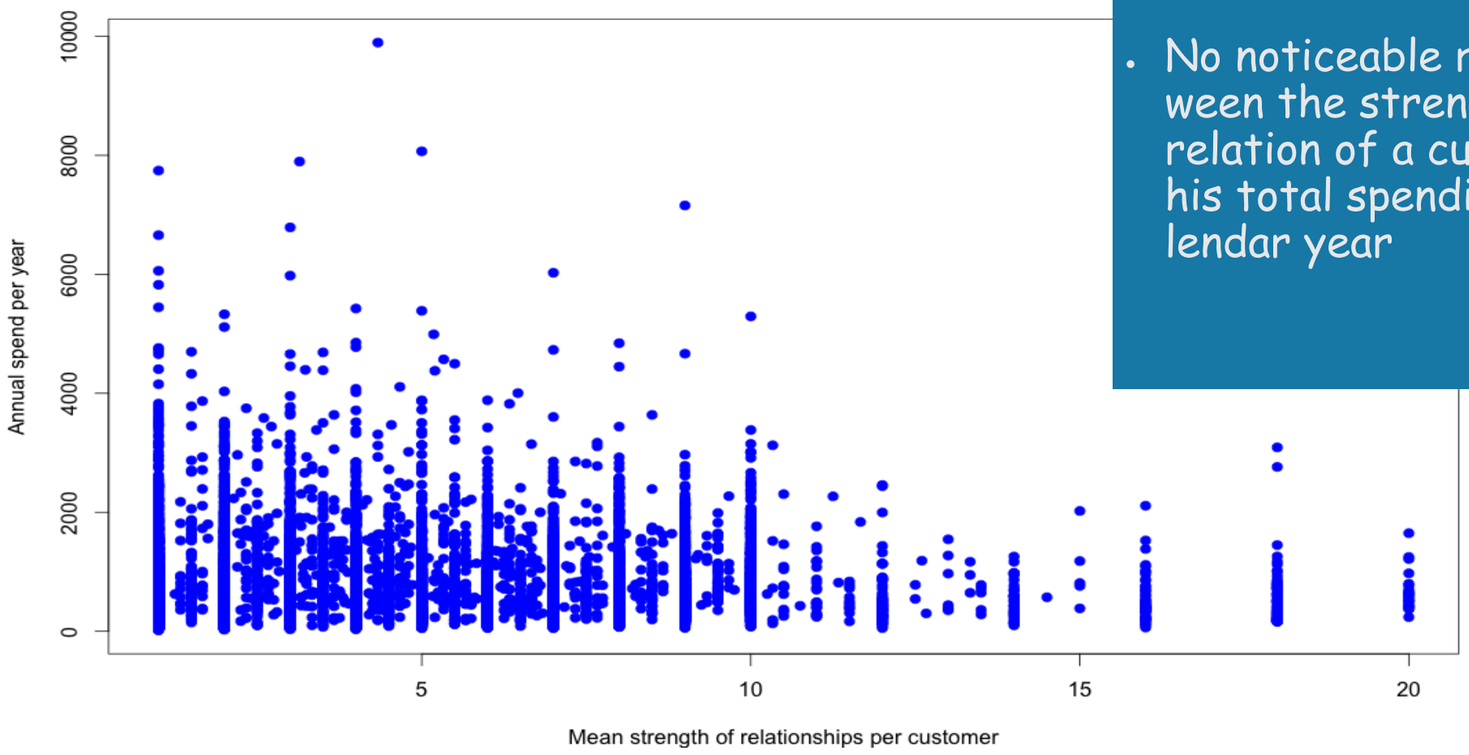
Number of relationships per customer

- Average: 1,6
- Median: 1
- Maximum: 14

Total spend for the customer in the given year

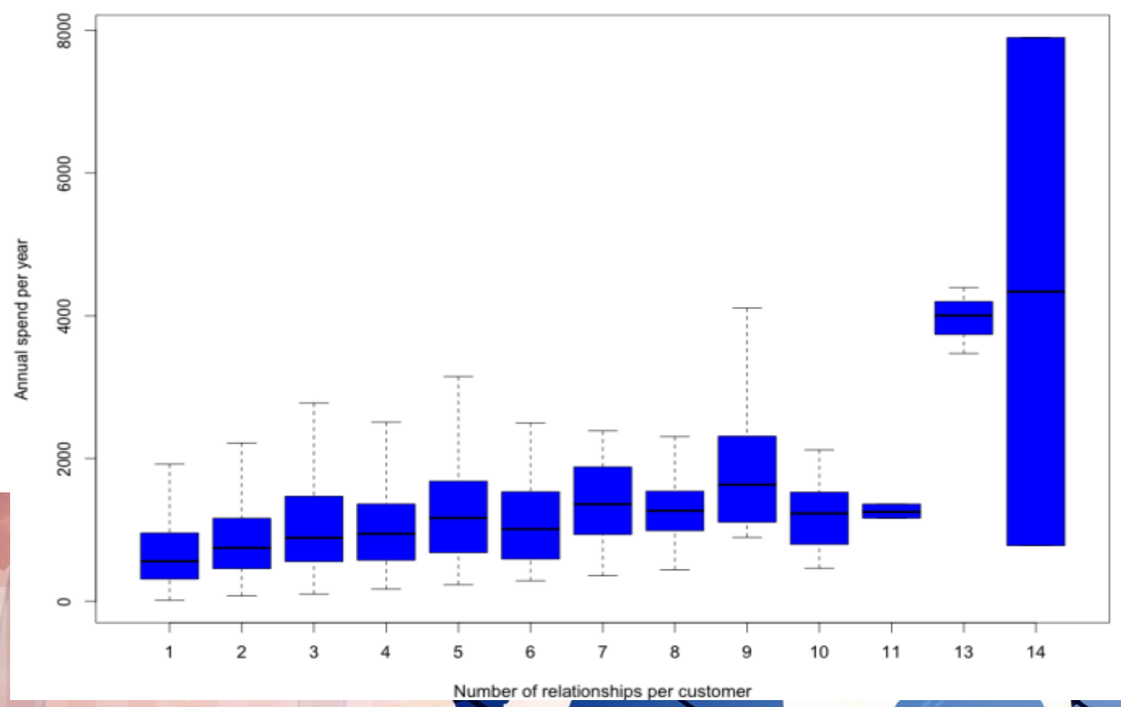
- Minimum: 28,2
- Average: 714
- Median: 545,4
- Maximum: 7,895

Strength of Relationships vs. Customer spendings



- No noticeable relation between the strength of the relation of a customer and his total spendings in a calendar year

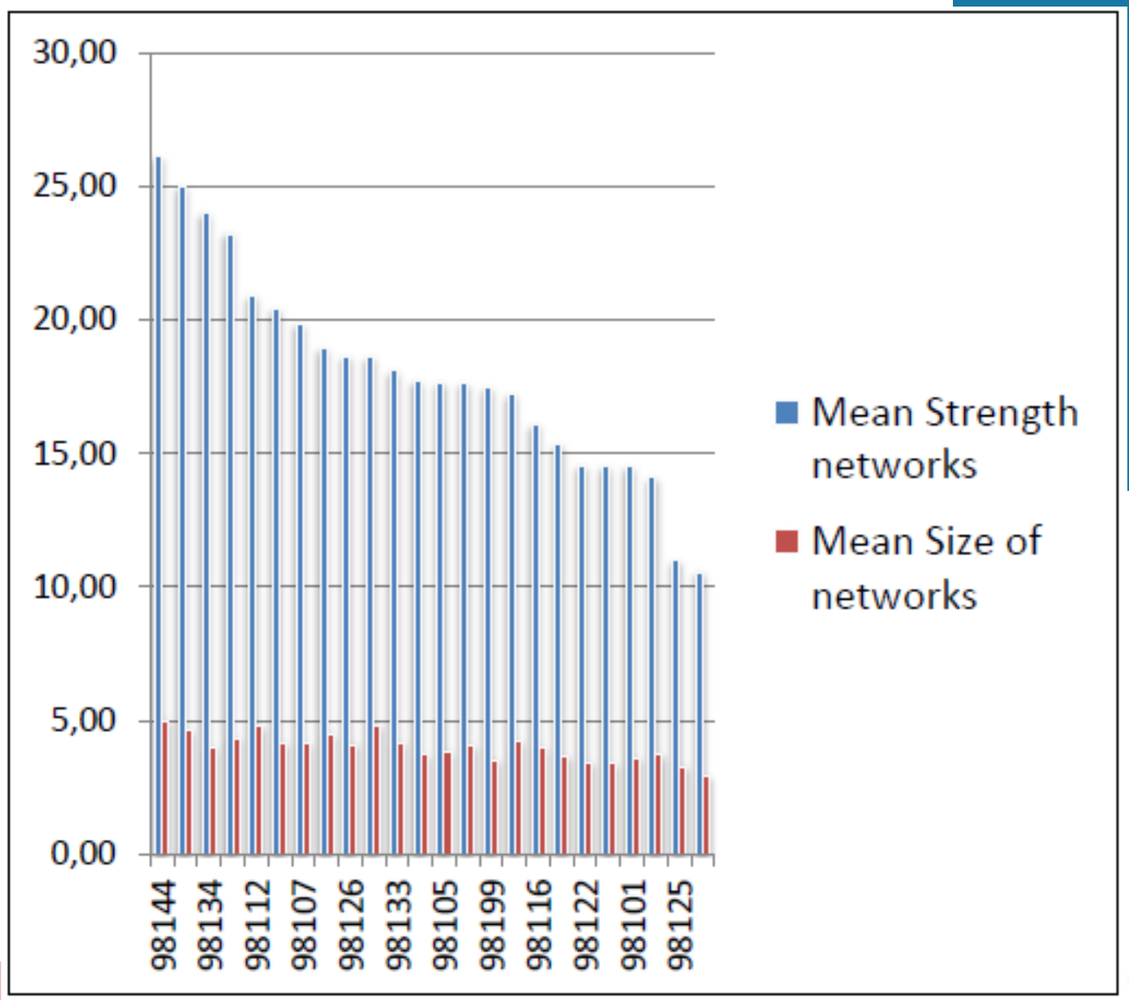
Number of Relationships vs. Customer spendings



- Customer Spendings tend to increase with number of friends
- No trend found for customers with large no of relationships due to lack of data

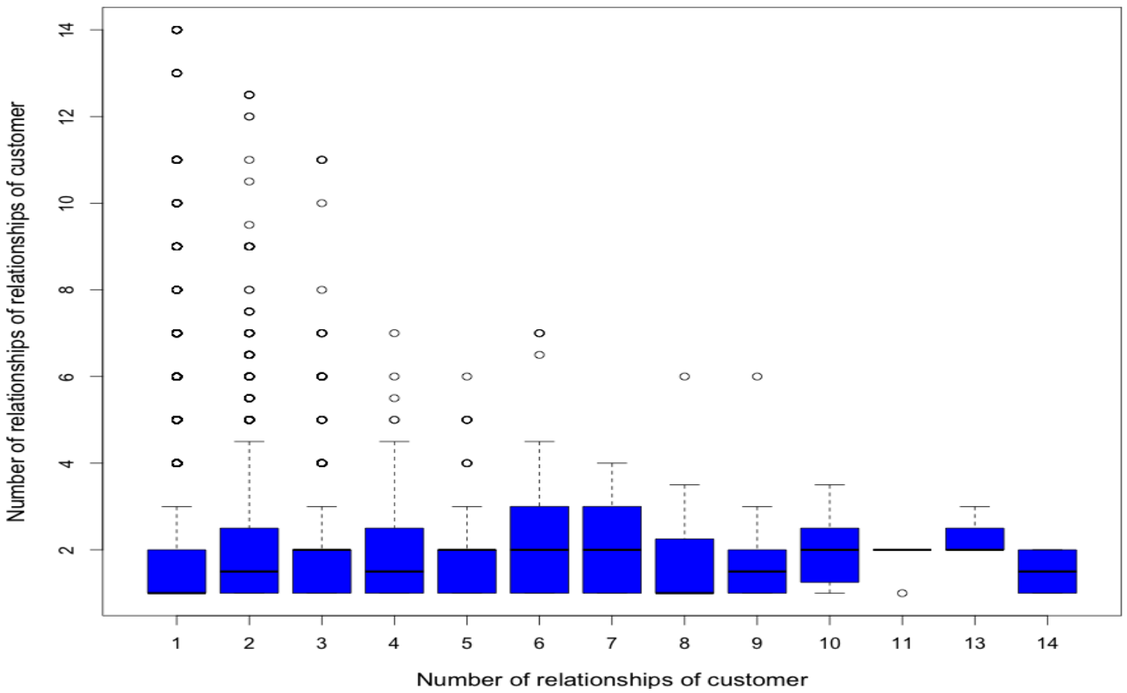
Number of relationships	frequency	Median of the annual spend	75% quantile of the annual spend
1	7557	561,9	957,97
2	1306	747,93	1162,97
3	407	889,66	1472,395
4	158	945,95	1361,475
5	84	1167,095	1675,485
6	49	1011,76	1534,47
7	28	1361,085	1878,685
8	12	1268,255	1500,41
9	10	1632,9	2260,2725
10	7	1232,1	1528,655
11	5	1252,75	1362,8
13	3	4003,72	4198,96
14	2	4337,77	6116,53

Strength and Size of Networks Per Sites (coded)



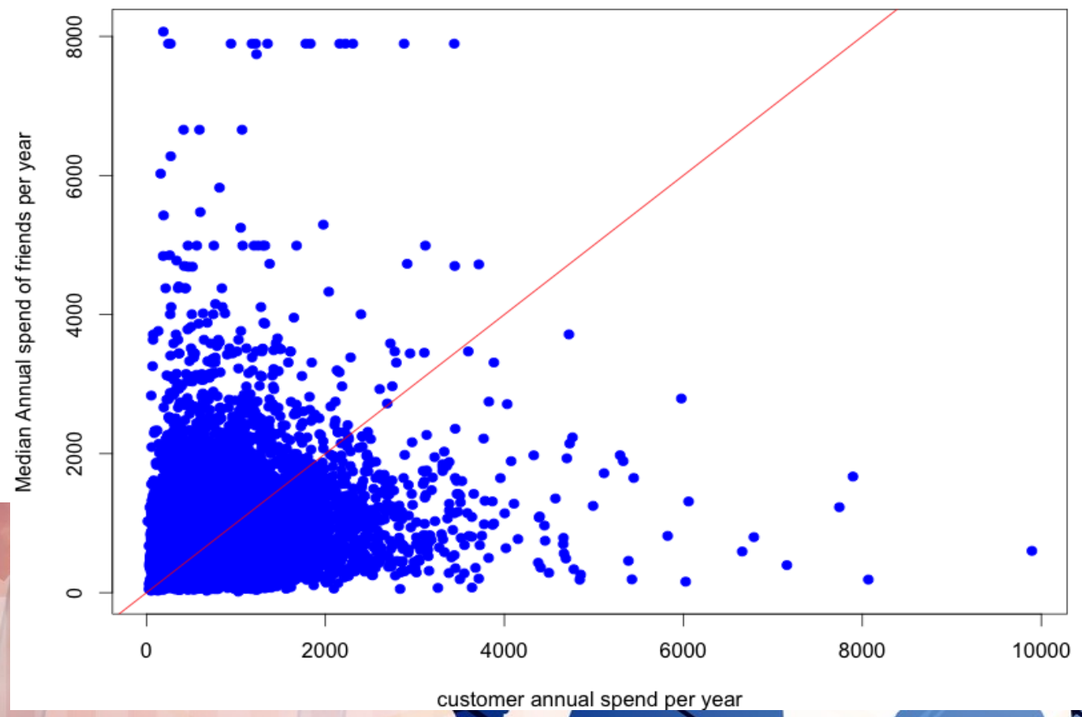
- There are some sites where the strengths of the networks are very high such as sites 98144 in comparison to 98102.
- The size of the networks follows the same pattern as the strength but the differences are less noticeable.
- Note: One could also cluster the sites on a map to find regions where the strengths and sizes of network are alike.

Strength of Relationships vs. Customer spendings



- Up to a few outliers 75% of the relationships of customers have less than 3 relationships
- 50% of the relationships of customers have less than 2 relationships
- The relationships are balanced only for customers with 1 to 3 relationships.

Number of Relationships vs. Customer spendings



- Question: How many customer, which annual spend is x, have relationship that spend between 50%x and 150%x annually in average.
  - Answer: 0,02%
- Question: How many customer, which annual spend is x, have relationship that spend between 10%x and 190%x annually in average.
  - Answer: 1,28%
- The relationships are unbalanced with respect to annual spend of customers vs. that of their relationships

Percentage for the window width	Percentage of customer respecting the rule
30	0,00
35	0,01
40	0,01
45	0,01
50	0,02
60	0,06
65	0,08
70	0,10
75	0,17
80	0,28
85	0,47
90	1,28
95	5,26
100	100,00

Which customers to target for promotions?

- There are several factors to take into account when answering this question but the main factor would be
  - The aim of the promotion: Should the return on investment be maximized on short or long term?
- We have seen that the relationships are balanced only for customer that have a few friends and that customer with more friends tend to spend more annually. Hence having relationships with customers that spend far less annually
  - The short term strategy would be to target clients with the most relationships as they tend to spend more and have relationships that have as much relationships as other customers in the network (i.e. 1 to 3 relationships)
  - The long term strategy would be to target customer that are at the center of the network or are member of more than one community within the network. Therefore maximizing the number of customers links directly or indirectly in the network

Link Analysis and long term strategy

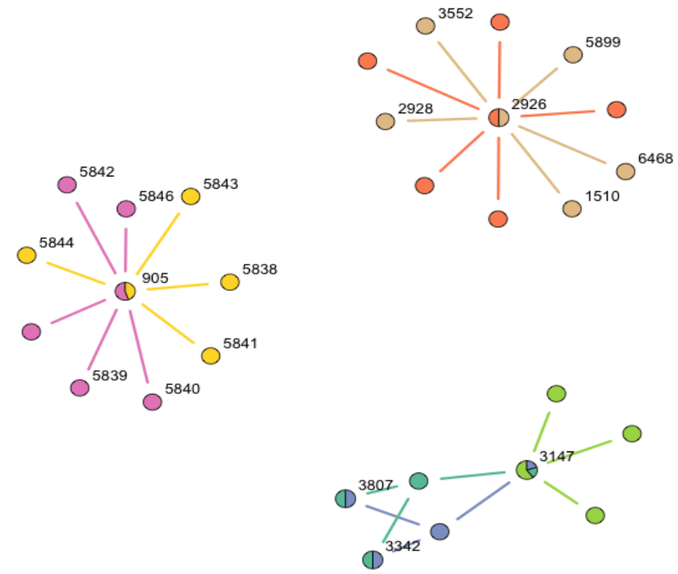
- Applying link analysis to the data with the strengths of the link being proportional to the number of times the customers call each other yields
  - Number of nodes = 9628
  - Number of links = 6655
  - Number of communities = 249
  - Number of nodes in largest cluster = 10
- We use the community centrality of a node in a network to target the most important nodes (customers) in a network.
- Nodes that belong to a lot of different communities will get the largest community centrality scores, whereas nodes that belong to overlapping, nested or few communities will get the lowest scores

Long term strategy: Top centrality score

- Nodes that belong to a lot of different communities will get the largest community centrality scores, whereas nodes that belong to overlapping, nested or few communities will get the lowest scores

node	Community centrality score
3147	3,11
2926	2,82
905	2,80
791	2,75
1974	2,71
1511	2,71
1815	2,71
4699	2,71
929	2,60
5858	2,60
1820	2,38
6784	2,38
6787	2,38
5838	2,27
5841	2,27
5843	2,27
5844	2,27
5676	2,20
5678	2,20
5679	2,20

Top 20 communitycentrality scores



Communities of the 3 nodes with highest centrality scores

Outlook

Given more data one could refine the promotion spends

1. Given data on the network through time, one could predict the evolution of the network thus being able to target key players nodes beforehand and optimize return
   → **Network prediction**

2. Given the entire Senegal call transactions one could actually deduce whether or not a client is more likely to call back or not
   → **Classification or customer segmentation**

3. Given long term spend habits, and other attributes of customer it would be possible to apply time series analysis to detect spending patterns and therefore avoid targeting a customer for a promotion although in all likelihood he or she would spend regardless
   → **Leading the way to lift modeling**

Outlook

4. Historical response to promotions would be crucial in deciding which customer should be targeted even when the customer is a new one

→ **Scoring new customers**

5. Having all the above data, the retailer could use its prediction on the evolution of the network and its historical responses to promotions to target new market, where the likelihood of a positive response to promotion is high

→ **Market analysis**

6. Customer care being at the center of the business sentiment analysis with data on the network could improve the efficiency of the service and client loyalty

→ **CRM**

7. Having mastered all the above challenges the retailer could speed up the service by profiling its customers and therefore anticipate buying patterns

→ **Customer Segmentation and profiling**

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Martin-Schmeißer-Weg 10

44227, Dortmund

Germany

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info@smartdata-analytics.de
www.smartdata-analytics.de