Using Automatic Concept Classification for Post-Hoc GroupSystems Meetings

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Introduction

GroupSystems idea generation techniques can allow for the creation of more ideas than meeting leaders and participants can easily synthesize [1]. Group categorization processes are generally time consuming and resource intensive. Meeting leaders often use techniques to generate large numbers of divergent ideas and then synthesize those ideas into meaningful categories. The synthesis process is time consuming and often difficult for a large group of meeting participants. An alternative technique is to spend more time and resources on idea generation by allowing a large number (70 or more) of people to generate ideas and use an off-line technique for synthesis. This technique is viable in a focus group setting where participant decision making is not part of the agenda.

This paper reports on a case study of a real estate organization (RO) which chose to allow for as wide participation as possible in its idea generation process. The RO used an artificial intelligence program to help a small group of meeting leaders synthesize those ideas. The next section describes the management challenge to solicit agent recommendations and is followed by a description of the use of the AI tool to synthesize the huge volume of divergent data collected from agents. The final section discusses management implications and future work for this method.

Annual Agent Recommendations

The RO is a large real-estate company with agents concentrated in the Phoenix and Tucson areas. The President leads the organization and works closely with senior vice presidents from each of the two cities and a real-estate consultant. The four constitute the executive management team that makes strategic and operational decisions. Below the executive management team are

the senior managers who manage individual real estate offices.

The RO uses a participative management style where the real estate agents make budget, policy and operational recommendations, which are used by the senior management team. For the last three years, the Center for the Management of Information (CMI) at The University of Arizona has worked with RO in a coordinated research effort to determine techniques to solicit agent recommendations through GroupSystems meetings and coordinate meetings with the senior managers to address those recommendations.

Each year the RO's planning cycle begins with the senior management team outlining the significant issues that need to be addressed in this cycle. They range from broad issues such as what are the future trends of the real estate industry to narrow issues such as the effectiveness of the voice mail system. After defining major issues of concern, the executive management team meets with facilitators at CMI to develop meetings to solicit agent recommendations.

This year the executive management team wanted to expand the number of agents that could participate in the agent recommendation meetings without increasing meeting costs or participation time. In the past, agents have been enthusiastic about the opportunity to make recommendations to the executives, but were not interested in loosing time away from sales activities.

The RO held four half day sessions, two in Tucson and two in Phoenix for soliciting recommendations from about 100 agents. The sessions used GroupSystems V. The agents' agenda covered a range of topics including future trends, advertising budget allocation, advertising tool evaluation, agent benefits, and use of the computer and voice mail systems. The half day agenda is shown in Table 1. To cover the wide range of questions and accommodate 100 agents, most of the meeting time was devoted to divergent tasks and relatively little to convergent activities.

One month after the agent meeting, the senior managers were to meet to make decisions on the recommendations. Using the recommendation of the agents, the senior managers intended to make specific decisions for the coming year.

In the month between the two meetings, the executive management team coordinated with CMI facilitators to develop a strategy for the senior managers' meeting. The data collected from the agents' meetings was over 1000 pages and both unwieldy and time consuming to review. The executive management team needed to synthesize the data to a small enough quantity for the senior managers to review before the next meeting without biasing the information or leaving out the richness of the recommendations.

After the data was collected from the 4 meetings in 2 different cites the post hoc analysis process started. The CMI facilitator team used an artificial intelligence (AI) concept classification tool [2] to automatically classify comments and help analyze the data. This analysis process is described in the next session.

Time	Activity	Tool
8:00 am	Introduction	(none)
8:15 am	Future Industry Trends	GO
8:45 am	Advertising Budget Allocation	VO
9:00 am	Rate the Advertising Tools	VO
9:10 am	Comment on the Advertising Tools	GO
9:30 am	Describe Your Self Promotion Ideas	GO
9:50 am	Evaluate Agent Benefits	GM
10:00 am	Why Benefits Aren't Being Used	GO
10:15 am	Break	(none)
10:30 am	Discuss Voice Mail	EB
10:45 am	How Can the Computer Systems be Used Better	EB
11:00 am	Rate Yourself on Computer Ability	VO
11:10 am	What Should Managers DO	IO
11:25 am	Top Ten Management Duties	VO
11:35 am	Evaluate Training Programs	GO
11:45 am	Session Evaluation	GO

Table 1. Agent Recommendations Meeting Agenda

Post Hoc Analysis of Agent Recommendations

The post hoc meeting analysis was done in seven stages. First, the meeting data were printed and organized in a large note book according the questions in the meeting agenda. Second, the Executive management team met with a team of facilitators to review the goals of the meeting, critique the meeting agenda and identify key questions to answer with the participants data. Third, each segment of data from the meetings' Group Outliner (GO) and Electronic Brainstorming (EB) sections were analyzed with the AI concept classification tool. The AI concept classification tool uses a neural network to analyze the text generated in each of the GO and EB sessions. The techniques used are mainly based on automatic indexing, concept space generation, and neural network classification. The tool extracts subject descriptors from discussion comments to identify the semantic relationships among these descriptors and to discover consensus topics or ideas underlying these comments. Fourth, the classifications and the underlying text for each category were organized into a book for presentation to the executive management team. Fifth, in addition to the concept classifications, the facilitators imported the quantitative voting results into a spreadsheet to provide statistical and time series analysis. This data was then added to the book. Sixth, the CMI facilitator team presented the results of the concept classification tool to the executive management team. The executive management team was asked to develop a paragraph or less definition for the classification and review the classifications to highlight statements which were relevant to the category. Finally

seventh, the CMI facilitation team organized an executive summary of the all data. The summary package was delivered to the manager of each branch office and used as a template for a senior management meeting.

Meeting Data

Over one thousand pages of meeting interaction were reproduced and organized in a three ring binder. The meeting interaction was organized according to the agenda. A table of contents was developed after each page was numbered and multicolored pieces of paper were used to separated sections.

The initial post hoc meeting between the CMI team of facilitators and the executive managers was held less then a week after the session. The time frame for the first post hoc meeting was ideal because the meeting was still fresh in the minds of the facilitators and the executive team but far enough removed to allow for clear reflection on the meeting. In the post hoc meeting the CMI facilitator team and the executives reviewed the agenda and re-acquainted themselves with the general goals of the meeting. A set of guiding questions was derived by the team to use as a guide for post hoc analysis (i.e., what are the future trends in the industry or which marketing and advertising tools are most effective for you?).

Data from each GO and EB session was analyzed with the concept classification tool [1]. Twenty concepts (the default for the tool) were derived from the text. Each concept consisted of phrases up to 3 words which were related. The following is an example of the raw analysis data:

Example 1

Future Trends: What are you doing as a sales agent to keep up with future trends?

1. TRENDS/LEARN/HOME COMPUTER/
2. MARKET/STAY/TOUCH/
3. CRS/EDUCATION CLASSES/
4. OFFICE/PURCHASE/PLAN/
5. FUTURE/TUCSON/REAL ESTATE INDUSTRY/
6. REGULAR BASIS/
7. INCREASE FOLLOW-UP/
8. BUSINESS|
9. EFFECTIVE|
10. TIME|
11. TECHNOLOGY|
12. PROGRAM|
13. SOFTWARE|
14. FARM|
15. KNOWLEDGABLE|
16. NAME|

17. TELEMARKETING|

18. SYSTEMS|

19. LEARNING|

20. BUYER|

1. TRENDS/LEARN/HOME COMPUTER/

Comments related to Topic 1

Number of Comments: 16

********   The following comments contain 2 Topic terms   ************

1.11 CREATE A MORE SOPHISTICATED PERSONAL BROCHURE AND SPECIALIZE IN CERTAIN AREAS OF OUR INDUSTRY -- BECOME VERY KNOWLEDGEABLE ABOUT THE CURRENT AND FUTURE TRENDS FOR TUCSON AND THE SOUTHWEST REGION IN GENERAL. USE MY HOME COMPUTER IN MORE EFFECTIVE WAYS.

1.14 be open to new marketing trends realize that I am self employed and work for myself use all resources available to me in office purchase home computer.

1.57 LEARN, EDUCATION, SPECIALIZE MORE IN NARROW AREAS, TRY TO WATCH TRENDS IN MY SPECIALTIES, AND MOVE ON THEM.

2.10 Learn what the upcoming trends are receive designations. Update my processes for leads and transaction follow through.

2.36 always learning the latest trends in computer software and what it can do for my business. listen to tapes of the successful and learn their strategy.

************   The following comments contain 1 Topic term   ***************

2.1 buy my computer and learn how it will make me more effective

2.31 learn how to write an ad without use of adjectives since the fair housing gang has banned lost of them.

1.7 emphasize experience in personal advertising, keep abreast of trends in technology, continue to specialize in specific areas, increase follow-up to past clients, increase personal marketing.

1.9 utilize home computer for MLS access.

1.20 learn more about taxes in relation to real estate.

1.36 With the onset of the infamous "information Highway" it is imperative that all agents become computer literate. Stay up to date on current market trends. Look at new and refreshing methods for individual marketing.

1.30 learn more about exchanges of real estate.

1.58 WORK WITH BUYERS AND SELLERS SO THEY UNDERSTAND THE TRENDS. BECOME MORE ADEPT ON PRODUCTS AVAILABLE TO MAKE WORKING TIMES MORE EFFECTIVE AT HOME, AT OFFICE AND OUT IN THE FIELD. KNOW THE NEW HOUSING AS WELL AS POSSIBLE BECAUSE THAT'S WHERE IT IS FOR THE NEXT YEAR AT LEAST. DEVELOP MORE OF AN ATTITUDE THAT I CONTROL WHAT I DO.

1.67 Learn from my colleagues.

2.35 It is my believe that to stay in the front of the up coming trends one has to continuously educate yourself.

1.101 Need to stay in touch with past clients, follow up, follow up....Break into the higher price homes, or upper end on today's market. Learn more about the total concept of computers, not just one software program.

In example 1 the overarching question addresses future trends the agents anticipate. There were several specific subsets of the general question used to guide agent responses. In example 1 the question was "What are you doing as a sales agent to keep up with future trends?" The 20 concepts listed below the question in example 1 were generated with the AI concept categorization tool. After the 20 concepts the first concept, **1. Trends/learn/home computer**, is listed with the underlying comments which made that classification.

The raw classification concepts and the supporting text were placed into a large three ring binder and presented to the executive management team. The CMI facilitator team discussed the results with the executive management team. The CMI facilitator team asked the executives to review the phrases making up each of the categories and the underlying comments which made the general concept. The executives were asked to determine which of the generated categories were meaningful to them, decide why the phrases clustered in the category, write a summary paragraph for each classification, and highlight a few examples to illustrate supporting evidence for the classification. The executive team was asked to get the relevant data to the CMI facilitation team in a week.

Finally, all the analyzed meeting data were synthesized and organized into a book. Spreadsheets and graphs were used to illustrate numerical data from votes and budget analyses. The general questions asked in the meeting were answered with the data from the classification concept analysis. Clusters of words were presented with a summary sentence or paragraph from each category. Several examples from the data were added to the category to give the reader a flavor for the type of interaction which created this concept. The following is an example of the executive summary:

EXAMPLE 2

WHAT ARE THE FUTURE RECOMMENDATIONS FOR [RO]?

1.2.1 FUTURE TRENDS: *IN REGARDS TO THE INDUSTRY, WHAT ARE YOU DOING TO POSITION YOURSELF FOR THE FUTURE TRENDS*

PEOPLE/PLAN/NAME - PLAN TO INCREASE MY CLIENT BASE, THE PERCENTAGE OF REFERRAL BUSINESS ATTAINED AND MAKE MY NAME A HOUSEHOLD WORD. APPLY EFFORTS TOWARD MARKETING AND WORKING MY FARM AREA MORE COMPLETELY, INCREASE MY SPHERE OF INFLUENCE, AND/OR TARGET AREAS

IGNORED BY OTHERS BY FREQUENTLY CONTACTING THEM USING PROMOTIONAL MATERIAL, SUCH AS NEWSLETTERS AND PERSONAL BROCHURES, WHICH SHOULD BE UPGRADED REGULARLY.

2.8 I PLAN TO WORK MY FARM AREA MORE COMPLETELY--TRY TO GET MY NAME ACROSS TO PEOPLE WHEREVER I GO AND WHATEVER I DO, AND HOPEFULLY, THEY WILL BEGIN TO IDENTIFY ME WITH REAL ESTATE AND I WILL BECOME A HOUSEHOLD WORD - #8

2.10 INCREASE THE SIZE OF MY PERSONAL SPHERE. I BELIEVE THAT THE NUMBER OF PERSONAL CONTACTS, AND HOW FREQUENTLY I KEEP IN TOUCH WITH THEM, WILL DIRECTLY AFFECT THE % OF REFERRAL BUSINESS. I PLAN TO BUILD MY BUSINESS ON PERSONAL REFERRALS! -

2.15 CURRENTLY HAVE AN IBM COMPATIBLE 386 SYSTEM WITH WINDOWS AND MS-DOS. PLAN TO TARGET SPECIFIC AREAS TO FARM AND PRODUCE A MONTHLY NEWSLETTER. I CURRENTLY HAVE A PERSONAL BROCHURE IN 115 HOTELS AND RESORTS THROUGHOUT THE EAST VALLEY, PROMOTING RESALES, NEW HOMES, AND RETIREMENT HOMES. - #15

1.17 FIND AREAS OF TARGETING POTENTIAL CLIENTS WHICH ARE IGNORED BY OTHER AGENTS. - #20

1.8 CONSTANTLY UPGRADE QUALITY & PROFESSIONALISTIC LOOK OF PROMOTIONAL PIECES. FIND NEW WAYS OF MARKETING MYSELF RATHER THAN THE COMPANY. - #8

REAL ESTATE/COMPANY - WITH THE GROWING MARKET AND COMPANIES RELOCATING AND/OR ADDING TO THEIR EMPLOYMENT, WE SHOULD AGGRESSIVELY APPROACH BUILDERS, SMALL TO MID-SIZE COMPANIES, AS WELL AS, LARGE CORPORATION IN AND OUTSIDE OF ARIZONA.

2.18 I WOULD LIKE TO MARKET MYSELF MORE TO SMALL TO MID SIZE CORPORATIONS OFFERING A FULL RANGE OF REAL ESTATE SERVICES TO THEIR EMPLOYEES. - #22

1.10 AS A COMPANY WE NEED TO AGGRESSIVELY APPROACH COMPANIES THAT ARE RELOCATING AND ADDING TO THEIR EMPLOYMENT HERE IN THE VALLEY

1.13 TREND: MORE COMPANIES COMING INTO THE AREA, THEREFORE WE NEED TO ACTIVELY SOLICIT RELOCATION COMPANIES, PERSONNEL OFFICES, HEAD HUNTER COMPANIES TO SECURE A LION'S SHORE OF THIS BUSINESS.

2.13 AS THE MARKET WITHIN NORMAL CITY LIMITS IS GROWING LARGER AND FURTHER TOWARD THE OUTSKIRTS, PRICE ARE RISING AND ARE QUICKLY BEING LESS AND LESS AFFORDABLE TO MANY PEOPLE AND I AM WORKING IN OUT LYING AREAS THAT ARE NOT HEAVILY WORKED WITH A BUILDER IN DEVELOPING SMALL SUB-DIVISIONS, ON ACREAGES.

1.4 MORE INDUSTRY BASED JOBS. MARKET DIRECTLY TO LARGE CORPORATIONS IN ARIZONA AND ALSO OUTSIDE ARIZONA. - #4

COMPUTER TECHNOLOGY/TECHNIQUES/EQUIPMENT - THE TECHNOLOGIES AND TECHNIQUES IN TODAY'S REAL ESTATE INDUSTRY REQUIRE AGENTS TO BE MORE KNOWLEDGEABLE, COMPUTERIZED, MOBILE, AND ABLE TO ACCESS INFORMATION IMMEDIATELY. AGENTS SHOULD STAY UP-TO-DATE, LEARN AND UTILIZE ALL OF THE MATERIALS [RO] HAS TO OFFER, THE NEW COMPUTER PROGRAMS AND EQUIPMENT, THE LATEST MARKETING TECHNIQUES, AND CONTINUALLY REEVALUATE THEIR PROCEDURES

AND BRAINSTORM FOR IDEAS TO BE MORE COMPETITIVE, SUCCESSFUL AND OBTAIN A MORE GLOBAL PERSPECTIVE TO SURVIVE IN THE INFO HIGHWAY WORLD.

1.16 THE INDUSTRY WILL BE LOOKING FOR MORE SERVICE AND MARKET KNOWLEDGE FROM REAL ESTATE AGENTS. I WILL USE COMPUTER TECHNOLOGY TO TRACK OTHER MARKET AND OBTAIN A MORE GLOBAL PERSPECTIVE.

1.14 THE TREND TO BE MORE COMPUTERIZED, MORE MOBILE, & HAVE IMMEDIATE ACCESS TO INFORMATION IS HERE...I MUST TAKE ADVANTAGE OF IT. - #14

2.11 MAKE MYSELF AWARE OF NEW TECHNOLOGY AS IT BECOMES AVAILABLE, AND LEARN TO USE THEM TO THERE FULL ADVANTAGE. - #11

1.15 TRY TO STAY UP TO DATE IN THE USE OF COMPUTERS AND UP TO DATE EQUIPMENT. THE MARKET PLACE IS BECOMING A MORE COMPETITIVE ARENA AND THE ORDINARY AGENT WILL NOT BE ABLE TO BE SUCCESSFUL WITHOUT ADAPTION AND CONTINUAL REEVALUATION OF THEIR PROCEDURES.

2.14 STAY CURRENT WITH ALL THE LATEST MARKETING TECHNIQUES . - #14

2.6 TRY TO KEEP FAMILIAR WITH THE NEW PROGRAMS THAT ARE CURRENTLY IN USE TODAY IN REAL ESTATE AND IN OTHER AREA AND BRAINSTORM FOR IDEAS THAT COULD ASSIST MYSELF AND THOSE IN MY OFFICE.

Example 2 illustrates the executive summary which the CMI facilitator team made for the executive team and the senior managers to use in a follow-up meeting. In the segment used in example 2 the general questions is, "What are the future recommendations for [RO]?" A specific question was asked to frame the responses of the agents, "In regard to the industry, what are you doing to position yourself for the future trends?" One of the categories which emerged from concept classification tool was PEOPLE/PLAN/NAME. The executive team wrote a summary describing what they think this category means. Several comments were taken from the raw data and used as supporting evidence for the executive teams interpretation of the AI generated concept.

The reasoning behind this approach was to give the agents and senior managers the executive's interpretation of the "raw and categorized" data. The examples were included to illustrate how the agents contributed to the RO and provide behavioral data to allow for alternative interpretation.

Conclusion

The AI concept classification tool allowed the executive management team to involve more agents and ask more questions of those agents than could have been done within the same budget if the agents had been asked to synthesize their recommendations as a group. This process also used less time than if the executives and facilitators had summarized the information by hand.

The facilitators lacked content expertise, so the concept classification tool was a great help to the facilitation team. The team would not have been able to do as much of the synthesis work

without the AI tool and a greater percentage of the synthesis man hour would have fallen on the executive management team. Therefore the executive time was used more effectively.

In this case, the executives made one pass at editing the data after the facilitators organized the data with the AI tool. This reduced the report from over 1000 pages to about 70. If the executives made one more pass at the data and it was proof read and formatted by a secretary with good computer skills, then a better report would have followed. The report used in this case was more effective than the raw data, but it could have been shortened and refined.

A danger with the post-hoc approach is that the people, in this case the agents, may not feel as strong a buy-in to the decision than if they reached consensus and developed synthesized recommendations. In this case, the agents placed considerable trust in the executive management team's use of the data and did not want to spend any more time than necessary away from making sales and were enthusiastic about the process. In another context, people may not be so eager to give up the synthesis process.

This technique may be useful to a team which meets regularly. One meeting could be used to generate data, the data could be organized off-line then brought back to the group for evaluation and convergence. This process may save the regular team significant meeting time.

References
[1] Nunamaker, J. F., Briggs, R., Mittleman, D. *Ten Years of Lessons Learned with GroupSystems.* Working Paper, Center for the Management of Information, University of Arizona, 1995.

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