



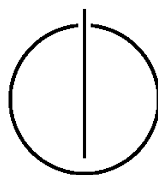
FAKULTÄT FÜR INFORMATIK

DER TECHNISCHEN UNIVERSITÄT MÜNCHEN

Masterarbeit in Informatik

Personalisierte Email Massenkommunikation

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Personalized Mass Email Communication

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Ich versichere, dass ich diese Masterarbeit selbständig verfasst und nur die angegebenen Quellen und Hilfsmittel verwendet habe.

München, den July 6, 2013

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Mein herzlicher Dank gilt...

Abstract

Reaching out large-scale of people via internet is a fast and cost efficient way comparing with postal mail or telephone. Therefore, email has been used not just for research, but also for marketing, customer support, and other data collection purposes. However, getting an acceptable response rates on the sent out emails requires additional efforts from the researchers' side. This thesis investigates a communication system which contributes increasing the response rates while minimizing the burden on the researchers' side.

To achieve this, system constructs a workflow helping researcher to extract information, providing rule based automated decision making mechanism on respondents' emails, and personalize the content of the send out emails with the extracted respondents' information. System also provides an option to enable involvement of other researchers to interact with the workflow under the permission of the initial researcher. Therefore, distribution of the work can ease the individual's efforts on the mass email communication. This feature can be further extended on enabling crowd workers on distribution of the work.

This thesis demonstrates that providing a proper workflow and the possibility of an assistant contribution, a mass email communication can be achieved as if each email is individually tailored to each recipients. Therefore, while it keeps the efforts at minimum on the creation of emails, it maximize scale on the number of people communicated.

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1 Introduction

Increased Internet usage turned email as a tool for communication replacing telephone and regular mail (Norman and Lutz, 2000; Madden and Rainie, 2003). There are many use cases showing that email plays a huge role as a communication tool. Some of them includes marketing for engaging clients, customer support for offering assistance after sale, surveying people to get their opinion on a topic, and many other cases showing that email become essential part of our daily life. However, when the amount of people you want to reach increases, the way how you compose the emails and extract the information changes. Because, the individual effort will not be enough anymore to individually tailor the emails according to each recipients or reading out all the respondent's emails to extract the answers that you seek for.

There are several products in the market focusing on email communication and data collection. Customer relationship management (CRM) softwares keep track company's communication with their clients. Help desk softwares offers a platform to solve customers' problems or provide guidance regarding products. Email marketing application help out sending commercial messages to group of people. Finally, survey applications aid to conduct online surveys to people's opinions and behaviors. One of the common property of all of these application is their dependency on email communication. However, none of these mentioned tools offers a complete workflow to help out a researcher to make an email communication possible with a great amount of people in a personalized manner and as easy as possible like communicating with an individual.

The goal of this thesis is understanding the possible workflow of a personalized mass email communication, and showing that it is possible reaching a great amount of people as well as keeping the communication personalized. A complete system, named Myriad,

1.1 Email as a data collection method

has been developed to demonstrate the practical aspects of the idea.

1.1 Email as a data collection method

Nearly 600% growth rate on world-wide internet usage between 2000 to 2012 makes Europe's 63% and North America's 80% overall population internet usage rates (Group, 2012). Email is ranked as most popular online activity along with search engines usage as 92% among online adults use them (Purcell, 2011). Also, connectivity and flexibility are increased with the introduction of smart phones and tablet devices (Madden and Jones, 2008). In addition to these facts, email has low costs and quick turnover compared to regular mail or telephone communication (Zikmund and Babin, 2006). Therefore, email as a part of internet communication is considered as a viable option for data collection (Zikmund and Babin, 2006).

There are several reasons for data collection depending on the situation. However, purposes of data collection can be grouped under the following three categories (Babbie, 2012, pages 92–94):

1. To explore and get information about a topic
2. To describe the events and the situations
3. To explain things by questioning

To illustrate these purposes to see how we can use email to explore, describe, and explain things, let's suppose that we have an online learning platform offering various courses publicly.

Exploration Offering online courses is a relatively new trend, therefore we don't have a previous knowledge about the topic. To explore the popularity of the platform, we need to ask questions about platform's users: Why are they attending our online courses? Have they taken any online courses before? What are their income levels? Figuring out the answers of these questions will help us to improve the system or to decide its future. For example, the aggregated answers to the income question will make us to decide whether to charge the users for their usage or offer it for free but find sponsors to make it viable.

Description Our goal can be to describe characteristics of the online learning platform's users. The questions helping us to describe this can be: Where do they come from? What are their age range? Have they attended to a college? At the end, we might end up with a description of users profile like Users, at the age of 16 – 22, who have never attended to a college, and coming from less developed countries. According to this result, knowing our user portfolio can help us to attract organizations who have already had engagements to support those countries' young population. Hence, they can include our platform as a tool to reach those populations.

Explanation We figured out that our platform users' age range is between 16 – 22 in our descriptive study. The reasons of why this ended up like that make our explanatory purpose. The questions like how often they are connected online or have they attended a college or similar high level education institute might help us to found out the answer of why young people uses our platform than older people. Collecting such statistics may help us to develop an explanation to the topics.

Since all of our registered users provided their email addresses as a primary and mandatory contact medium, we can use email to conduct our data collection whether reason is to explore, describe or explain the user trends on our online learning platform. REMOVE>However, we will see the possible problems of this in the following section.

1.2 Problem Statement

(paper E21 p 442)To date, researchers have used Web page-based surveys to study large groups of on-line users (e.g. Kehoe, Pitkow and Morton, 1997) and e-mail surveys to study smaller, more homogenous on-line user groups (e.g. Parker, 1992; Smith, 1997; Tse et al, 1995). However, it appears that a relatively untapped use for the Internet is to use e-mail is to survey broader Internet populations on both a national and international basis. WRITE the problems in here as well form that paper. Problems related from researchers perspective. Also mention briefly about the purpose and design of the those surveys.

The main goal of this thesis is that personalized communication with large groups is

1.3 Outline

possible when a proper workflow is provided. To achieve this goal:

1. Examine the workflow of an email communication with large groups and possible exceptional cases on this flow
2. Investigate the effects of email content's personalization on the response rates
3. Comparison of existing products claiming to provide solutions on email communication and recipient's related information collection
4. Provide an application satisfying the mentioned workflow to aid researchers
5. Real life use cases of the application and its users opinions about the application

This thesis also contributes on the following areas:

1. Email as a data collection method
2. Surveying with email
3. Defining a workflow on a mass email communication
4. Possible crowdsourced assistant usage
5. Personalization of email content according to recipients

1.3 Outline

Outline goes here

2 Foundation and Related Work

This chapter presents the related work on the data collection domain, which mainly includes surveys. The factors affecting response rates. Comparison of existing products in the market to aid data collection.

2.1 Surveys and data collection

A Survey is defined as a system for collecting information (Sue and Ritter, 2011, page 3). It helps to learn about people's opinions and behaviors (Dillman, 2009). The produced data during or at the completion of the survey belong to the data collection process. Therefore, data collection is a fundamental step to produce useful data to enable analyses on researches (Groves et al., 2009, page 149). These researches include but not limited to many disciplines like sociology, statistics, psychology, marketing, economics, and health sciences.

2.1.1 Email surveys

Comparing many different characteristics of surveys and interviews, the concerns regarding speed and cost make the most powerful differences (Sproull, 1986; Schaefer and Dillman, 1998). Email surveys offers more rapid surveying than other methods including regular mail and telephone surveys. In addition to that, email surveys are inexpensive since it removes the postage, paper and printing, and interview costs (Schaefer and Dillman, 1998).

Sproull (Sproull, 1986) identified the characteristics of email with a organizational research, within a Fortune 500 office products and systems manufacturer, who were using email for 12 years in the organization and over 80 percent of all employees in the

2.1 Surveys and data collection

selected unit have email access at the time of the research. Selected candidates are separated into two groups. The data collection protocol within the organization asked each of the group's participants series of questions regarding their 3-day old email inbox. Both groups filled out the questionnaire and answer open-ended questions either electronically or in writing.

The result of the study indicated that the average duration of data collection time for email version was less than a week, which is half of the duration of the written version. While the response rate of email version was 73 percent, conventional written version's rate was 87. The percentage of missing data in the questionnaires was .2 percent in the written version, and 1.4 in the email version. There were no differences in mean answers in email version comparing written questionnaire.

In an another study from Sheehan and Hoy (Sheehan and Hoy, 2006), where they administered only an email survey to query individuals about their on-line behaviors and their attitudes and opinions regarding privacy. They have reached the shortest response time with 3.65 days comparing with earlier studies conducted until that time (See table 2.1).

Table 2.1: Summary of Survey Research Methods Using E-mail (Sheehan and Hoy, 2006)

Author	Response Sample	Survey Topic	Sample Size	Usable Sample	Method	Response Rate	Time (days)
Kiesler & Sproull (1986)	Employees of a Fortune 500	Corporate Communication	115	77	Mail	67%	10.8
			115	86	Email	75%	9.6
Parker (1992)	Employees of AT&T	Internal Communication	70	27	Mail	38%	NA
			70	48	Email	68%	NA
Schuldt & Totten (1994)	Marketing & MIS Professors (US)	Shareware Copying	200	113	Mail	56.5%	NA
			218	42	Email	19.3%	NA
Mehta & Sivadas (1995)	Usenet Users	Internet Communication	309	173	Mail	56.5%*	NA
			182	99	Email	54.3%*	NA
Tse, et al (1995)	University Population (HK)	Business Ethics	200	54	Mail	27%	9.79
			200	12	Email	6%	8.09
Bachman, Elfrink & Vazzana (1996)	Business School Deans	TQM	224	147	Mail	65.6%	11.18
			224	117	Email	52.5%	4.68
Sheehan & Hoy (1997)	University Population (Southeast US)	Privacy and New Technology	580	274	Email	47.2%	4.7
Smith (1997)	Web presence	Business Activities	150	11	Email survey	8%	NA
			150	42	Email solicit	11.3%	NA
Schillewaert, Langerak and Duhamel (1998)	Web users in Belgium	Attitudes toward the Web	430	125	Email	31%	NA

Continued on next page

Table 2.1 – continued from previous page

Author	Response Sample	Survey Topic	Sample Size	Usable Sample	Method	Response Rate	Time (days)
			62.5M	110	Ad in magazine	0%	NA
			4000	67	USENET Posting	2%	NA
			7500	51	Hyperlinks	0.68%	NA
Weible and Wallace (1998)	MIS Professors (US)	Internet Use	200	70	Mail	35.7%	12.9
			200	50	Fax	30.9%	8.8
			200	48	Email	29.8%	6.1
			200	52	Web form	32.7%	7.4
Schaefer and Dillman (1998)	University Faculty	Unknown	226	130	Mail	57.5%*	14.39
			226	131	Email	58.0%*	9.16
*Differences not significant							

In addition to speed of the email surveys, cost benefits have been indicated in Sheehan and Hoy's study (Sheehan and Hoy, 2006) also concluded that email is an extremely cost-efficient method for data collection, where the total cost estimated at \$470 (\$30 for printing out the responses, \$440 for 22 hours computer time to download surveys for printing) while postal mail is estimated at \$6,500 (printing, postage, survey, and reminder mailing).

In another study from Mavis and Brocato (Mavis and Brocato, 1998), the email survey was nearly seven times cost efficient than postal survey. This includes labor hours, survey materials like booklets, mailing labels, envelopes, and postage costs. Total time spent into postal survey was 33 hours, but it only required 12 hours for the email survey. Final cost was \$503.36 for postal survey, whose \$305.36 was spent for postage part, and remaining \$198 was spent for student labor cost. The only cost resultant from email survey was student labor cost, which was total \$72.

Moreover, Paolo, et al., (Paolo, 2000) reported that people made longer open-ended response comments in email version of the survey comparing with mail version. While the average number of words per comment was 58.33% in the mail version, and it was 75.40% in the email version of the survey. Bachmann, et al., (Bachmann, 1999) had the same finding in 1995 and 1998, where open-ended questions were responded much likely by email recipients than the mail recipients. In the latter study conducted in 1998, researches also found that email respondents were more likely to expand their answers, even it was not

2.1 Surveys and data collection

suggested by the survey, resulting more candid responses than mail surveys. Responses to open-ended questions is one of the important measure to determine the quality of the returned surveys (Bachmann, 1999).

Given these advantages and positive benefits of email surveys, next section will provide information about surveys errors applicable to all type of surveys.

2.1.2 Survey Errors

Sample surveys are quantitative estimation of the distribution of a characteristics in a population by obtaining this information from a small portion of the corresponding population (Dillman, 1991). To generalize results from a small portion, which is a sample, to a population, following sources of errors needs to be considered (Dillman, 2006, page 9) (Dillman, 1991):

Sampling Error The more number of people surveyed, the large degree of precision can be achieved. Therefore, the limitations on the number of people surveyed are considered under the sampling error. For example. while public opinion of 100 people results $\pm 10\%$ of the true percent, 2,200 people results higher confidence with the percent of $\pm 2\%$ (Dillman, 2006, page 9). The surveys relying on predefined list of recipients considered that the list is randomly generated or with a systematic sampling. Hence, it has got little research to reduce sampling errors comparing with face-to-face interviews in which multistage cluster designs¹ are used due to cost and time limitations (Groves et al., 2009, page 106) (Dillman, 1991).

Coverage Error When the list of surveyed people does not include all the elements of the population, coverage error happens (Dillman, 2006, page 9). Coverage error is considered one of the biggest issue of surveys since while surveying general public (Dillman,

¹ Cluster sampling selects preexisting groups of population elements instead of a single element of the population (Groves et al., 2009, page 106). Departments of a university or households in a block represents clusters of people. When the allocation of those sampling resources are stratified and based on multiple stages, frequently three stages, it is called multistage cluster sampling. First step selects the sample of counties, followed by the blocks within those counties, and finally the dwellings from the chosen blocks (Scott and Smith, 1969).

1991).

Measurement Error When a respondent's answer is hard to evaluate or cannot be compared with other respondent's answers or there are inconsistencies between the observable variables like opinions, behaviors, or attributes and the survey responses, measurement error happens (Dillman, 2006, page 9) (Dillman, 1991). The possible reasons might depend on poor wording or order of the questions or the characteristics of the surveyed person such as incapability to provide correct answers or motivational factors (Dillman, 1991).

Nonresponse Error When there are large amount of people who do not response, and their characteristics are different from the ones who responded, then it results nonresponse error (Dillman, 2006, page 9). Low response has been considered a major problem, and many researches have focused on improving the response rates (Dillman, 1991).

2.1.3 Response Rate Influences

As mentioned in the previous section, one of the survey errors is the nonresponse error. Researchers have concerns regarding response rates, since responses coming from survey participants may be substantially different from those of nonrespondents, which will result in a biased estimate of representation of the population (Bogen, 1996).

Low response rate was even considered shortfall of the email methodology despite to its advantages (Bachmann, 1999). In table 2.1, there are nine studies where both postal mail and email are compared side by side. Out of those nine studies, four of them show high response rate on postal mail, three of them got higher response on email. and two studies did not show any significant differences. Parker's (1992) study of AT&T employees was the only study which got an acceptably high response rate by email. Schaefer and Dillman attributed this fact to the novelty of email and sent emails were carefully examined instead of considered company junk email (Schaefer and Dillman, 1998). Mavis and Brocato stated that studies cited by others in support of email surveys, also shown in table 2.1, did not compare email data collection with more traditional methods, and their study design and analyses varied greatly (Mavis and Brocato, 1998). Sheehan and Hoy

2.1 Surveys and data collection

also takes the attention to many of these studies' small and homogeneous population, therefore it may not represent larger population groups' response tendencies (Sheehan and Hoy, 2006).

Therefore, researchers investigated on how to increase response rates at email communication. Schaefer and Dillman (1998) conclude that even though, the technology for email is quite different from well established postal mail surveying methods, the communication is considered similar to self-administrated questionnaires delivered by post. Hence, the techniques used to increase response rates on postal mail can be applied to develop a email methodology (Schaefer and Dillman, 1998). Following techniques are the ones where researchers focused on their effects on response rates.

Length For many people the time required to spend on survey is considered the biggest cost (Dillman, 2009, page 26). The study from Heberlein and Baumgartner (1978) also states that the length of the survey has a negative effect on mail survey response rates, where they stated that each additional question reduces responses by .05% (Heberlein and Baumgartner, 1978). On the other hand, Bradburn (1978) suggests that the length of the survey is correlated with its importance, therefore it will increase the efforts both on researchers and respondents side resulting a higher response rate (Bradburn, 1978). Bogen (1996), in his literature review, concluded that the relationship between interview length and nonresponse is weak and inconsistent (Bogen, 1996).

Multiple Contacts Researchers found that the number of attempts to contact people increases the response rates (Heberlein and Baumgartner, 1978; Schaefer and Dillman, 1998). The scenarios for multiple contact include pre-notification contact, which is a brief notice for the main request, and follow-up contacts aiming to the people who did not respond at the initial contact. Heberlein and Baumgartner (1978) showed that follow-up mailing has a mean return rate of 19.9% at the initial contact, and continued with 11.9% and 10.0% for the second and third contacts, respectively (Heberlein and Baumgartner, 1978). Schaefer and Dillman (1998) also stated the same conclusion for the multiple contacts for email in their literature research. According to this, the average response rate for email surveys with a single contact was 28.5% while 41% and 57% for two and more

than two contacts, respectively (Schaefer and Dillman, 1998).

Personalization Personalization has been addressed as an important factor to increase response rates by many researchers (Dillman, 1991; Schaefer and Dillman, 1998). It builds a connection between the respondent and researcher by making the respondent feel important, and drawing the respondent from out of the group (Dillman, 2009, page 272). Dillman and Frey (1974) conducted a study to see the effects of personalization, where they reached half of an university alumni sample via personalized cover letters, while the other half got unpersonalized letters. The personalization treatment included personal salutations and real signatures on the mails. They achieved nearly 9% greater response rates for the personalized group (Dillman and Frey, 1974). It is also stated that this type of personalization techniques can be also applied to emails (Schaefer and Dillman, 1998). In the next section, we will continue with the applications of personalization in emails, and give the results of some studies.

2.1.4 Personalization of emails

Studies on mail surveys showed that personalization increases the response rates (Dillman, 1991; Schaefer and Dillman, 1998). Personalization is also important for email communication since it also builds a connection between the respondent and researcher as in the mail surveys studies, and make them feel more important and valued (Dillman, 2009, page 272). With this argument, Dillman, et al., emphasized the social exchange theory² of the personalization of the email.

On the other hand, Barron and Yechiam (2002) stressed on the sociopsychological phenomenon, the diffusion of responsibility, which is also an outcome of volunteer's dilemma. In the volunteer's dilemma one player is needed to volunteer in order to reach the outcome preferred by all the others in the game. However, each person might be inclined to hoping that somebody else will be volunteer, resulting a higher utility of not volunteering than volunteering. According to this, the more people in the group size, the less probabil-

² Social exchange theory was considered as a frame of reference to other theories rather than a theory by itself. It implies a two-sided, mutually contingent and rewarding transactions or exchanges (Emerson, 1976).

2.1 Surveys and data collection

ity of volunteering will result, which produce the diffusion of responsibility effect (Barron and Yechiam, 2002). In order to experiment the effect of diffusion of responsibility in the context of email requests, they sent emails asking for help either to single addresses or to a list of five addresses. In the email body (see Appendix A), a fictitious graduate student asked a question to know if the university has a biology faculty, whose answer was well known to anyone familiar with the institute. The result of the study showed that the proportion of replies where they use single email address in the "To" field got 20% higher response than the replies where they used groups of email addresses. In addition, the study qualified the given responses according to its helpful level, and the proportion of "very helpful" replies in the single email address condition was 187% higher than the groups of email addresses condition.

In an another study by Heerwegh (2005), personalization was applied to the salutations in the emails. The randomly drawn 2,540 samples from the student database of Katholieke Universiteit Leuven, Belgium was separated into equally sized two groups. In the non-personalized group, the salutation of "Dear student" was used, while in the personalized group "Dear [First name] [Last name]" was used. The email content was an invitation to a web survey which was about adolescent attitudes towards marriage and divorce. The result of the study showed that the personalization applied group got 6.9% higher login rate to the survey than the unpersonalized group. Therefore, they concluded that increased response rates were in line with social exchange theory and with the diffusion of responsibility theory (Heerwegh, 2005).

In addition to personalization of salutations on the emails, Joinson and Reips (2007) stated the power of its combination with the power or status of the sender. In the study, a group of discussion panel students of Open University UK were sent an email invitation to complete a survey. Panel members were assigned to one of the conditions where salutation was modified in "Dear student", "Dear John Doe", and "Dear John". The sender power was manipulated on the first and last lines of the emails by assigning a neutral power saying that "From <name> (Strategy, Planning, and Partnerships), The Open University" and a high power "From Professor <name>, Pro-vice chancellor (Strategy, Planning, and Partnerships), The Open University". The results showed that

the highest response rate was achieved when a personalized invitation came from a high power source and lowest when an impersonal one came from a neutral power source (See table 2.2). The possible reason for this was stated as personalized salutations increase people's sense of identifiability, and its combination with a high power audience increase socially desirable, strategic behavior (Joinson and Reips, 2007).

Table 2.2: Power, salutation and response rates (raw and %) (Joinson and Reips, 2007)

	Dear Student	Dear John Doe	Dear John
Neutral power	143 (40.1)	158 (44.4)	166 (46.6)
High power	150 (42.1)	154 (43.3)	190 (53.4)

As aforementioned studies showed that different forms of personalization increase the response rates in email communication. However, it has become very easy to add personalized information into email thanks to the softwares. Dillman, et al. (2009) stated that over-personalization using software tools might easily result impersonal messages, and gave an example (Dillman, 2009, page 237-238): "Dear Don Dillman, I am writing to inform you and your wife Joye that the XYZ Company has created a new dog food that we are sure your Boston Terrier, Crickett, will find to be very tasty. We would like to send a free sample to your home in Pullman, Washington." In this message, there is overwhelmed personalization with the usage of person's wife, their dog's type and name, and their home address. Moreover, experienced email users can identify if a message is written by a person or computer generated by looking appearance of one's name in certain locations, and similar patterns for other information (Dillman, 2009, page 272). Therefore, it becomes difficult to have a correct amount and tone of personalization. The more daily interaction with digital devices will make the true authentic personalization more rare, hence achieving it will make it more important and effective (Dillman, 2009, page 238).

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