

1. Introduction

RESEARCH QUESTION:

Are there specific patterns in the way people with different executive (organizational) positions use email

More specifically,

Metrics are utilized to discover the impact of the organizational positions on the email behaviour of people by providing detailed quantitative information about them

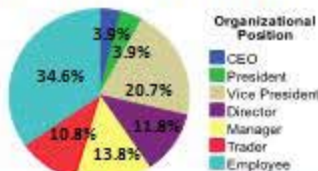
Email behavior: email activity of people regarding a series of measured metrics by *EmailTime*, e.g. number of Sent and Received emails as To or Cc, number of the email addresses, number of the created folders (by the owner of the email dataset) and size of the Sent emails

EMAILTIME [1]:

- Is a visual analysis of email correspondence patterns over the course of time
- Interactively portrays personal and interpersonal networks using the correspondence in the email dataset

2. Benchmark: Enron Email Dataset

- Is a unique large dataset [2]
- Contains more than 200,000 emails
- Time span for this case study is between January 2000 and December 2001
- There are missing actors and emails in the dataset
- Seven categories were identified [3] including 35 employees, 4 CEOs, 4 presidents, 21 vice presidents, 12 directors, 14 managers and 11 traders



Contact Information

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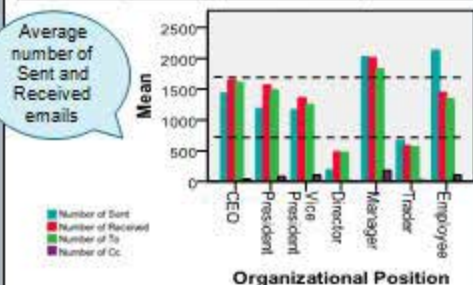


3 Analysis and Result

3.1 Analysis on the Activity Level

- Displays some groups behaved similarly regarding number of Sent, Received, and exchanged emails (sum of Sent and Received)
- We divide them into three categories – Modest, Moderate and Active (dashed lines)
- Managers and Employees were Active, Traders and Directors were Modest, and the rest were Moderate
- Employees have the highest average number of Sent emails
- Managers have the highest average number of Received emails

No of Emails	Modest	Moderate	Active
Exchanged (Sent + Received)	<1500 Directors, Traders	[1500-3500] CEOs, Presidents, Vice Presidents, Employees	>3500 Managers
Sent	<1000 Directors, Traders	[1000-1500] CEOs, Presidents, Vice Presidents	>1500 Employees, Managers
Received	<1000 Directors, Traders	[1000-2000] CEOs, President, Vice Presidents, Employees	>2000 Managers



Position	No. To (Mean)	No. Cc (Mean)
CEO	1608.7	41.0
President	1485.2	78.0
Vice President	1250.9	105.5
Director	470.9	9.7
Manager	1824.7	179.5
Trader	561.4	16.8
Employee	1340.7	105.9

Average number of Received emails as To and Cc

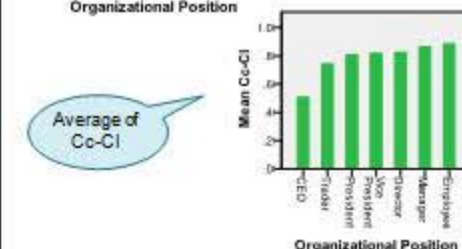
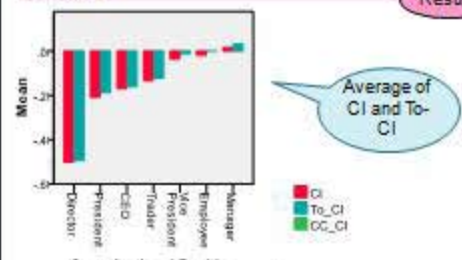
3.2. Analysis on the Types(Sender/Receiver)

Relationship	Organizational Positions
#Sent < #Received	Presidents, Directors, CEOs and Vice Presidents
#Sent = #Received	Managers
#Sent > #Received	Employees and Traders

- Contribution Index [4] is:

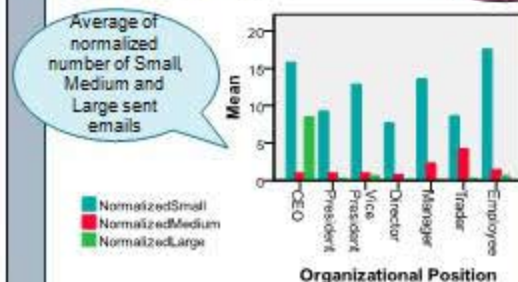
$$\frac{\text{emails sent} - \text{emails received (To+Cc)}}{\text{total of emails sent and received (To+Cc)}}$$

- 1 for the receivers and +1 for the senders
- We expand this formula to received as To (To-CI) and received as Cc(Cc-CI)
- Average Contribution Index of administrative people tends to be lower than that of lower positional staff
- CI and To-CI follow a same trend while Cc-CI has a different trend
- CIs of Employees, Traders and Managers are near zero (they had same amount of send and received emails in average)
- Then there is a jump to Director, President and Vice President where the three groups behaved as weak receivers



3.3. Analysis on the Size of Sent Emails

- We divided the Sent emails into four categories based on the number of recipients: Single nodes (one recipient), Small nodes (2-9), Medium nodes (10-29) and Large nodes (30 and up)
- A huge difference between CEOs and other groups in sending Large size emails
- Traders and then Managers sent Medium size emails more than any other groups



Position	Node Size	
	Med	Large
CEO	82	24
President	30	8
Vice President	207	44
Director	16	4
Manager	128	6
Trader	323	3
Employee	461	97

Average number of Medium and Large emails sent

4. Conclusion

- Some groups behaved similarly
- No relationship between the numbers of created folders and organizational positions was found in the dataset (a subjective issue)
- 80% of cases had the numbers of email addresses (with Enron domain) within the range of 2 to 6.
- From the results of ANOVA the only significant difference was for number of Email Addresses between CEOs and other groups

References

[1] M. Erfani Joorabchi, J. D. Yim, C. D. Shaw. *EmailTime: visualization of the temporal email*. GHD, October 2010.
 [2] B. Kilmt and Y. Yang. *Introducing the Enron corpus. First Conference on Email and Anti-Spam (CEAS)*, Mountain View, CA, October 2004.
 [3] W. W. Cohen. *CALD*, CMU, October 2004, from <http://www-2.cs.cmu.edu/~enron/>
 [4] P. Gloor, S. Niepel, Y. Li. *Identifying potential suspects by temporal link analysis*. MIT OCS working paper, January 2006.