Relationship Identification for Social Network Discovery

Chris Diehl
JHU/APL

Galileo Namata and
Lise Getoor
University of Maryland –
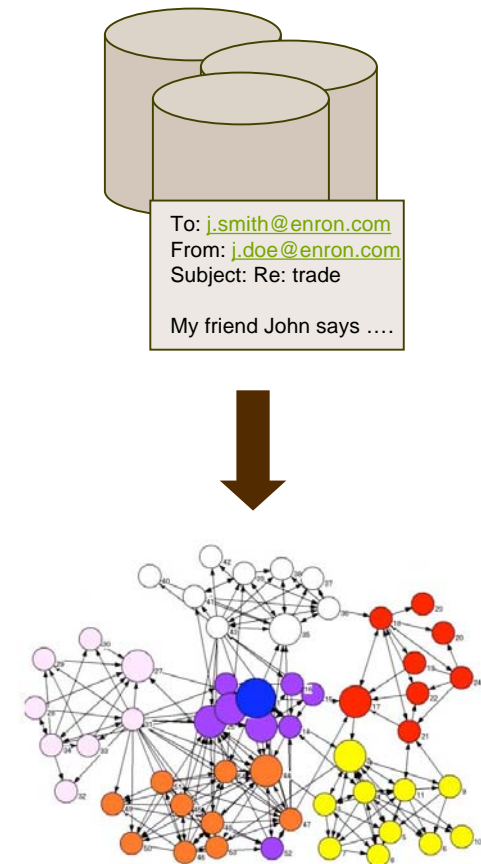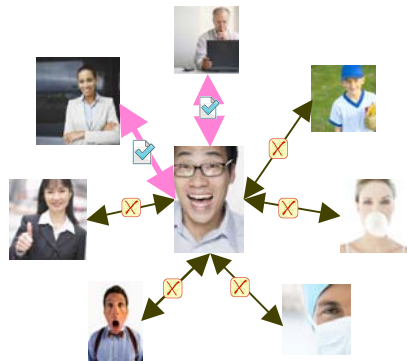*College Park*

Main Contribution

- ***Task***
  - Identify communication relationships exhibiting a given social relationship in a communications archive

- ***Main Result***
  - Defined and evaluated a supervised ranking approach for relationship identification

- ***Primary Lesson Learned***
  - Simple relationship representations go a long way!

To: j.smith@enron.com
From: j.doe@enron.com
Subject: Re: trade

My friend John says ….

Tools and Techniques

Labeled Ego Networks

Large-Margin Egocentric Relationship Ranking

Training

$$h(f_r) - h(f_o) > 0$$

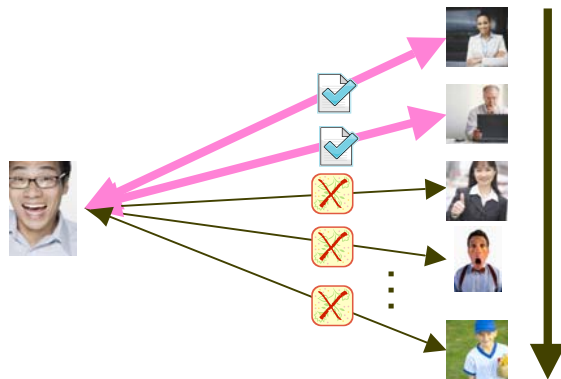$$\forall f_r \in \mathcal{F}_r(n), f_o \in \mathcal{F}_o(n), n \in N_t$$

$$h(f) = w \cdot \Phi(f) : \mathbb{R}^p \to \mathbb{R}$$

$$C(w) = \frac{1}{2}||w||^2 + \lambda \sum_{n \in N_t} \sum_{f_r \in \mathcal{F}_r(n)} \sum_{f_o \in \mathcal{F}_o(n)} g\left(m(f_r, f_o)\right)$$
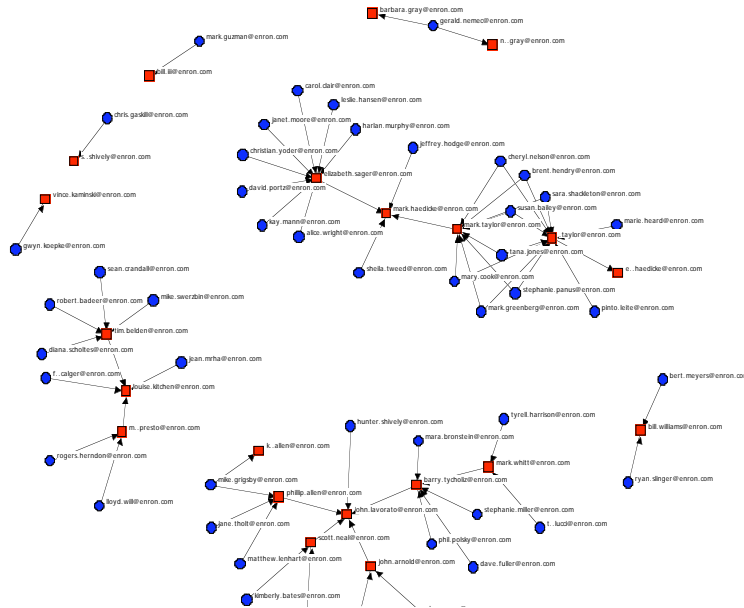
Relationship Ranking

Message Ranking

Analysis

To: j.smith@enron.com
From: j.doe@enron.com
Subject: Re: trade

I need your input on…

APL

Evaluation -
Enron Manager-Subordinate Relations

Organizational Ground Truth
January 2000 – November 2001

Relationship Ranking

Approach	Mean Reciprocal Rank
Content-Based with Attribute Selection	0.719
Content-Based	0.660
Traffic-Based	0.518
Random Selection	0.211
Worst Case	0.141

Evaluation -
Enron Manager-Subordinate Relations

From: tim.belden@enron.com

To: john.lavorato@enron.com,
louise.kitchen@enron.com

Subject: Off-Site Travel Question

The e-mail that was sent out many weeks ago about the off-site indicated that it would run from Wednesday night to Saturday AM. It is now running Thursday until Sunday… I had already made arraingements to attend a wedding in Oregon on Saturday night. It is a good friend of mine and my wife's… While I have authority to place millions of dollars of the company's money at risk, I don't feel comfortable signing up for a $7,000 extra flight without talking to you guys… Any thoughts would be greatly appreciated.

APL

Evaluation -
Enron Manager-Subordinate Relations

From: christian.yoder@enron.com

To: elizabeth.sager@enron.com,
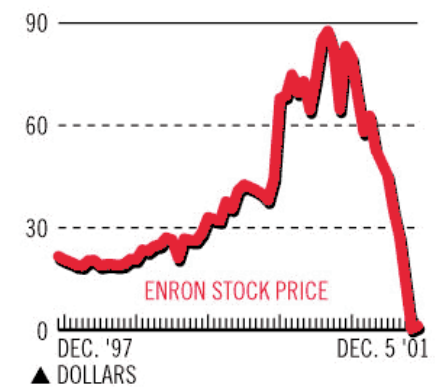
genia.fitzgerald@enron.com

Subject: Happiness

Happiness is looking at the new legal org chart (which Jan just now dropped on my desk). I always approach these dry documents as though they were trigrams resulting from throwing the coins and consulting the I-Ching. At the top of the trigram which I find myself listed in I see a single name: Elizabeth Sager, and at the bottom I see the name Genia FitzGerald. ... cgy
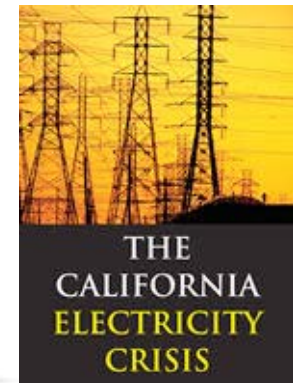
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Implications of Work

- **Event-Based Retrospective Analysis**
  - *"What happened?"*
  - **Goals**
    - Understand Org. Structure
    - Associate Org. Actions with Events
- **Interactive relationship identification key**
- **A number of learning challenges remain**

STUNNING COLLAPSE

ENRON STOCK PRICE

DEC. '97   DEC. 5 '01
▲ DOLLARS

Data: Bloomberg Financial Markets

RISK

THE CALIFORNIA ELECTRICITY CRISIS

Points for Discussion

- *Personal Email Management vs. Retrospective Analysis in Email Archives*
  - **What challenges do they share in common?**
    - Tracking Context
    - Associating Emails with Contextual Dimensions
  - **What aspects are distinct?**
    - Scale
    - Observability
    - Available Context
- *Process Design and Evaluation*
  - **Integration of HCI, Algorithms, Visualization**
  - **Strategies for evaluating process utility?**

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