How to Overcome Tiredness
Estimating Topic-Mood Associations
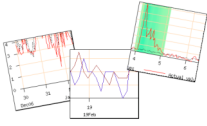
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MoodViews.com
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- Collection of tools for tracking the stream of mood annotated text made available by LiveJournal

- Moving from overview/tracking plots for a specific mood to topic-mood associations
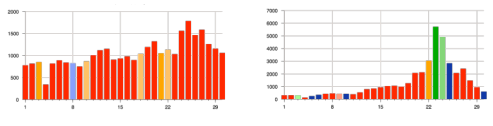

Moodspotter

- Exploring relationship between mood levels and the content of the mood tagged blog posts
- Moodspotter: returns the moods associated with the topic
- Baseline approach
  - Retrieve all posts that talk about the topic
  - Count the frequencies of the mood tags

Example

How the overcome tiredness?
i.e. how to select the most closely associated mood for a topic, instead of the most dominant (frequent) one - tired

tired	happy	thankful	excited	content	bored
sleepy	cheerful	full	amused	satisfied	giddy
busy	good	cold	worried	calm	angry

Outline

- Formalize the problem
- Three topic-mood association models
- Comparing models
- Conclusions

From topics to moods

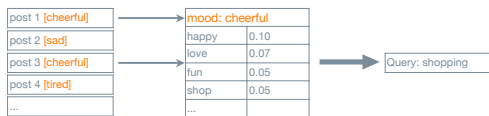- What is the probability of a mood m being associated with topic q?
- Determine $p(m|q)$
- Rank moods m according to this probability
- Instead of calculating directly, apply Bayes' Theorem

$$p(m|q) = \frac{p(q|m)p(m)}{p(q)} \implies \boxed{p(m|q) \propto p(q|m)p(m)}$$

- Estimate $p(q|m)$ using Language Modeling techniques
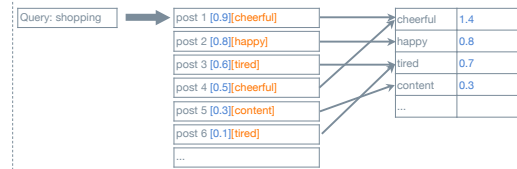- Mood prior $p(m)$ corrects for highly frequent moods

Model 1: Mood model

- A mood m is represented as a multinomial probability distribution over vocabulary terms
  - Amass all the term information from all the blog posts labeled with mood m
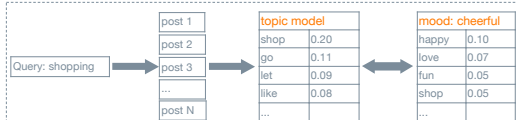- Predict how likely this mood would produce the query q

post 1 [cheerful]		mood: cheerful	
post 2 [sad]	→	happy	0.10
post 3 [cheerful]		love	0.07	→ Query: shopping
post 4 [tired]		fun	0.05
...		shop	0.05
		...	

Model 2: Post model

- Look at blog posts that best describe the topic
- Look at moods that are most strongly associated with these posts

Query: shopping →

| post 1 [0.9][cheerful] |
| post 2 [0.8][happy] |
| post 3 [0.6][tired] |
| post 4 [0.5][cheerful] |
| post 5 [0.3][content] |
| post 6 [0.1][tired] |
| ... |

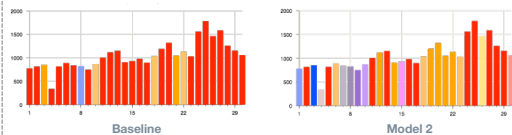| cheerful | 1.4 |
happy	0.8
tired	0.7
content	0.3

Model 3: Topic model

- Assume that both the posts and the query are sampled from an unknown topic model
- Estimate topic model using blog posts
- Calculate the difference between the mood models and the topic model

post 1		topic model			mood: cheerful	
post 2		shop	0.20		happy	0.10
post 3	→	go	0.11	↔	love	0.07
Query: shopping →	...		let	0.09		fun	0.05
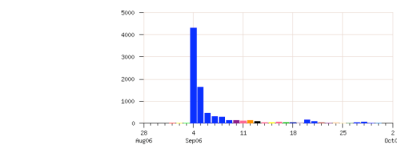| post N		like	0.08		shop	0.05
		...			...	

Comparing the three models

- Evaluation is non-trivial
  - No ground truth, only anecdotal evidence
- Case studies
- Practical considerations
  - Complexity
  - Efficiency

Case study
shopping

Baseline   Model 2

tired	happy	thankful	excited	content	bored
sleepy	cheerful	full	amused	satisfied	giddy
busy	good	cold	worried	calm	angry

Case study
Steve Irwin

date	#rel	Baseline	Model 1	Model 2	Model 3
2006-09-02	201	tired, bored, chipper	giggly, pleased, pensive	giggly, amused, pensive	tired, amused, calm
2006-09-03	227	tired, cheerful, awake	sympathetic, drunk, nauseated	happy, cheerful, awake	tired, happy, content
2006-09-04	4943	sad, shocked, crushed	shocked, sympathetic, sad	sad, shocked, crushed	sad, shocked, crushed
2006-09-05	2025	sad, crushed, tired	sympathetic, shocked, sad	sad, crushed, depressed	sad, crushed, shocked
2006-09-06	698	sad, tired, contemplative	thankful, sad, sympathetic	sad, tired, disappointed	sad, thankful, contemplative
2006-09-07	542	sad, tired, calm	sympathetic, enraged, morose	sad, blah, devious	sad, contemplative, tired
2006-09-08	501	sad, contemplative, tired	numb, shocked, sad	sad, blank, depressed	sad, numb, contemplative
2006-09-09	360	tired, sad, calm	enthralled, cynical, sad	sad, depressed, sleepy	sad, enthralled, contemplative
2006-09-10	362	tired, bored, happy	impressed, silly, lethargic	bored, ecstatic, sad	sad, contemplative, tired

Upshot

- Two types of phenomena
  - No significant event: hard task
  - Significant event: all models return reasonable results
    Baseline < Model 1 < Model 2 < Model 3
- Other considerations
  - Model 1: mood models (costly on-the-fly, can be pre-computed)
  - Model 3: mood models + topic model (only on-the-fly)
  - Model 2 can easily be implemented on top of an existing search engine, not necessarily require Language Models

Wrap-up

- Conclusions
  - Three models for capturing the association between topics and mood-annotated blog posts
  - Identified a clearly preferred model
  - Models are general
- Future work
  - Optimizations of our implementation of Model 2
  - Sequential aspects: dominant mood on a given day may depend on moods in previous days

Tired? You're not alone!

MoodViews.com

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Thank you!