Statistical Affect Detection in Collaborative Chat

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Introduction

To study the role that affect plays in distributed collaborative teams, we developed methods for detecting expression of affect in chat logs.

Our data spans 4 years of Nearby Supernova Factory, an international astrophysics collaboration, involving 30 scientists studying supernovae sharing a telescope three nights a week.

The goal is to label each message with affect expressed. We have labeled 5% of 300k messages manually; automation is necessary.

Each chat message must be classified as one or more of ~30 affect expression labels. The example below shows several anonymized messages, with labels by three human coders.

Time	Speaker	Message + labels by 3 coders
05:58:41	Alice	ok, so where was the f***ing SN on the image? #1: interest / anger #2: annoyance / confusion #3: interest / frustration
05:58:55	Alice	was it the bright blob? #1: interest / anger #2: considering #3: interest
05:59:03	Ben	5876 absorption is much wider than the H alpha in v space #1, #2, #3: no affect
05:59:18	Ben	Oh hmmm. #1, #2, #3: considering
05:59:28	Ben	Lemme see what [the] coordinates were... #1, #2, #3: no affect

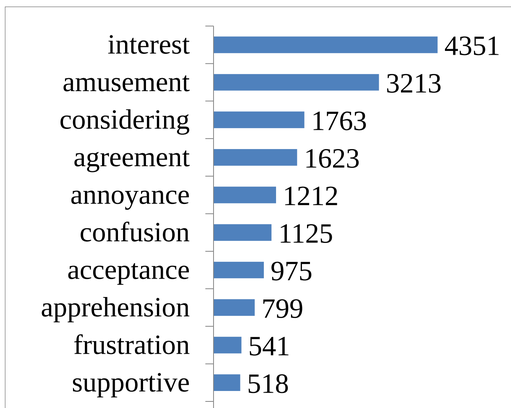
However, chat messages have challenging characteristics: they are short; contain jargon; with non-standard spelling, structure, and punctuation.

We must be able to detect both “what?” and “WHAAAAAAAT”

Our Approach

We tested different combinations of feature extraction methods and machine learning algorithms, comparing precision and recall for each of 13 most frequent codes.

To retain message context, despite shortness, we tried segmenting messages by time threshold, and using sliding windows in feature extration.



13 most frequently-occurring codes

We used lexicons (eg, emoticons); character-counting features; regular expressions (eg, *hm+*) as well as unigram features.

In short chat messages, even character-level peculiarities can be meaningful markers for affect expresion.

the telescope is stuck! >:(	Punctuation + emoticon → frustration.
the telescope is stuuuuuuuuuck...	Repetition →annoyance.
the telescope is stuck??	Multiple question marks → confusion

Results

The goal of this work is to make coding a large dataset for a set of interpretive affect expression labels more tractable using automation.

We created useful classifiers for the 13 most frequently-occurring labels in our own dataset. The features, shown below, are heavily weighted in SVM classifiers trained independently for each code.

In future work, we will consider graphical models to better incorporate message context during labeling.

Interest (F_1=0.925)	**Amusement** (F_1=0.734)	**Agreement** (F_1=0.779)
???? length	emoticon ";)"	"yes"
# question marks	emoticon ":)"	"yeah"
"je" (fr.) (-)	laughter	"yep"
"sunrise"	emoticon ";-)"	msg. length
"bert"	"fun"	segment duration
"est" (fr.) (-)	laughter length	"right"
"where"	"p"	"yup"
"wonder"	# people names	"agree"
"sunset"	"sleep"	"sure"
"interesting"	"of"	"okay"

Considering (F_1=0.761)	**Confusion** (F_1=0.738)	**Acceptance** (F_1=0.773)
“think”	???? length	"ok
# question marks	# question marks	"okay"
"maybe"	"understand"	"ah"
ellipsis length	"confus_"	msg. length
"or"	"why"	# 1st sg. pronouns
hmm length	"what"	"oh"
# hmmm	"nothing"	"yep"
???? length	"wrong"	# question marks
"probably"	msg. length	"put"
"x"	"thought"	segment duration

Annoyance (F_1=0.624)	**Apprehension** (F_1=0.638)
# swearing	"bad"
"pascal"	"something"
"--" (dash)	"problem"
"all"	"we"
"damn"	"seem"
"again"	"too"
"I"	msg. length
"only"	"not"
"me"	# 3rd sg. Pronouns
msg. length	# swearing

Supportive (F_1=0.626)	**Surprise** (F_1=0.71)	**Anticipation** (F_1=0.748)
"good"	# exclamation pts.	"hope"
???? length (-)	"wow"	"if"
msg. length	msg. length	"next"
"if"	???? length	"should"
"about"	!!!! length	"think"
"the"	"oh"	"will"
"--" (dash)	ellipsis length	"try"
"derek"	# repeated letters	"at"
"he"	segment duration	"like"
"think"	"right"	"to"

Serenity (F_1=0.663)	**Frustration** (F_1=0.673)
"good"	# swearing
emoticon ":)"	# 1st sg. pronouns
"nice"	msg. length
"cool"	ellipsis length
!!!! length	capital. length
msg. length	chars/second
"right"	# negation words
"too"	"it"
# 1st pl. pronouns	# repeated letters
“do” (-)	# interrogative prns

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