Semi-automatic parametrization of social context cognition model (for personality and affect generation)

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Original Problem

Personality models like ‘Big Five’ attribute features (e.g. openness, conscientiousness, extraversion, agreeableness, and neuroticism) that remain static over all contexts

But in fact, those features change significantly!
- difference between contexts = difference between people
- 50-50 person-situation rule
Psychological framework and proposed model

- mediating units
- very little detail

Solution: social Context based Personality (SCP)
- specification of CAPS
- connectionist model of social context cognition
New personality

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Problem with the developed characters

Complex. Many parameters.

How do we get good parameters?

Solution: offline crowdsourcing of the social context cognition
Literature study: crowdsourcing affective and socio-cognitive data

-VidL, a distributed video-labeling tool specifically designed for labeling affective data.

-‘Guess What?’ game crowd-sourcing affective video data labeling of social situations.

System often have problems with ‘no objective ground-truth’
- the agreement between the subjects is low,
- this reflects the subjective, culture variant elements

Serious differences to SCP
- SCP extracts precisely the above interpretation differences
- SCP not only probes labels, but also their quantitative relations

There is no real parallel system to compare against
Method overview

Domain specific sample preparation
- selection to reflect domain
- preprocessing (relevant labeling: ‘ball’ etc.)
- initial set feature selection

Obtaining parameters
- discrete (mediating unit labels)
- continuous (degree of their presence)

Parameter processing
- correlation/link estimation
- duplicate elimination

SCP generation
Some details, duplicate merging

Duplicate merging procedure
- when are the two terms identical? ‘Football player’ vs ‘goalkeeper’
- domain dependent, not lexical!
- calculate correlations between mediating units, e.g:

\[
C_{AP, RC}(ap, rc) = \sum_{a \in A} \frac{V_{AP}(ap,a,q) \cdot V_{RC}(rc,a,q)}{\sqrt{U_{AP}(ap) \cdot U_{AC}(ac)}}
\]

\[
U_X(x) = \sum_{QA(n) \in QA_X(x)} \frac{V_X(x, n)^2}{QA(n) \cdot QA_X(x)}
\]

- calculate the differences in correlation patterns
- propose merging when c. patterns of two terms < proximity tolerance
- system designer knows the domain, has the last call
Some details, feature evaluation

Feature evaluation
- use percepts to estimate features in linear regression:

\[
\tilde{V}_{SF}(f, s) = \sum_{p \in OP} (\alpha(p, f) + \beta(p, f)V_{OP}(p, s))
\]

\[
\beta(p, f) = \frac{\sum_{QA(n) \in Q_{AF}(f)} \frac{V_{OP}(p, n) \cdot \tilde{V}_{SF}(f, n)}{\sum_{QA(n) \in Q_{AF}(f)} V_{OP}(p, n)^2}}{2D_{SC, SF}(c, f)^2}.
\]

\[
\alpha(p, f) = \bar{p} - \bar{f} \cdot \beta_{SP, SF}(p, f)
\]

- compare human data with SCP’s output:
- difference between the two estimates feature quality (feature and component errors)

\[
E_{SF}(f) = \sum_{QA(n) \in Q_{AF}(f)} \frac{\tilde{V}_{SF}(f, n) - \tilde{V}_{SF}(f, n)}{|QA_{AF}(f)|}
\]

\[
E_{SC}(c) = \sum_{QA(n) \in Q_{SC}(c)} \frac{\tilde{V}_{SC}(c, n) - \tilde{V}_{SC}(c, n)}{|QA_{SC}(c)|}
\]
Testing

Domain: family life and sport. Facial expressions analyzed using emotion extraction software and used as percepts.

Test included 50 preprocessed samples, 10 subjects.

System obtained:
- 18 role components (auto-merged to 9)
- 11 situation components (auto-merged to 7)
- 8 group components (auto-merged to 6)

Validation of feature and component ‘errors’:

a) in training samples. e = 0.19, 0.12 (sd = 0.08, 0.03)
b) in unused samples e = 0.27, 0.19 (sd = 0.07, 0.03)
   avr. human error: e = 0.16, 0.13
c) SCP performance under data stream: e = 0.25, 0.22 with (sd = 0.08, 0.03)

- in trained samples: similar to humans
- in unused samples: decent performance for components. Features are harder.
- under stream of data: system is stable, potentially usable for social agents
Problem of static-personality issue was presented.

Socio-cognitive model was discussed and its shortcomings discussed.

Semi-automatic socio-cognitive model parametrization method was presented.

Validation shows promise, but issues with features must be addressed.
Thank you!