

Affects Associations Analysis in Emergency Situations

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Abstract : Association rule learning is an approach for discovering interesting relationships in large databases. The analysis of relations, invisible at first glance, is a source of new knowledge which can be subsequently used for prediction. We used this data mining technique (which is an automatic and objective method) to learn about interesting affects associations in a corpus of emergency phone calls. We also made an attempt to match revealed rules with their possible situational context. The corpus was collected and subjectively annotated by two researchers. Each of 3306 recordings contains information on emotion: (1) type (sadness, weariness, anxiety, surprise, stress, anger, frustration, calm, relief, compassion, contentment, amusement, joy) (2) valence (negative, neutral, or positive) (3) intensity (low, typical, alternating, high). Also, additional information, that is a clue to speaker's emotional state, was annotated: speech rate (slow, normal, fast), characteristic vocabulary (filled pauses, repeated words) and conversation style (normal, chaotic). Exponentially many rules can be extracted from a set of items (an item is a previously annotated single information). To generate the rules in the form of an implication $X \rightarrow Y$ (where X and Y are frequent k-itemsets) the Apriori algorithm was used - it avoids performing needless computations. Then, two basic measures (Support and Confidence) and several additional symmetric and asymmetric objective measures (e.g. Laplace, Conviction, Interest Factor, Cosine, correlation coefficient) were calculated for each rule. Each applied interestingness measure revealed different rules - we selected some top rules for each measure. Owing to the specificity of the corpus (emergency situations), most of the strong rules contain only negative emotions. There are though strong rules including neutral or even positive emotions. Three examples of the strongest rules are: {sadness} \rightarrow {anxiety}; {sadness, weariness, stress, frustration} \rightarrow {anger}; {compassion} \rightarrow {sadness}. Association rule learning revealed the strongest configurations of affects (as well as configurations of affects with affect-related information) in our emergency phone calls corpus. The acquired knowledge can be used for prediction to fulfill the emotional profile of a new caller. Furthermore, a rule-related possible context analysis may be a clue to the situation a caller is in.

Keywords : data mining, emergency phone calls, emotional profiles, rules

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