Generating Explanations for Algorithmic Decisions of Usage-Based Insurances using Natural Language Generation

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Abstract: Usage-based insurances are becoming more and more popular, especially for cars. We present an approach to use Natural Language Generation (NLG) in order to explain customers which aspects of their behaviour influenced the assessment which is performed by these insurances.

Keywords: Explainable AI; Natural Language Generation; Telematics

1 Usage-based insurances

So-called telematic insurances use different sensors installed in a car to track the individual driving style of the driver. Instead of calculating insurance premiums based on statistical risk groups, insurance companies can use these data to create individual risk profiles and calculate insurance premiums accordingly. While at the moment, most of the usage-based insurances are car insurances, it is expected that in the future other areas will follow, e.g. health insurances with premiums calculated based on data from wearables and fitness trackers. In the UK, usage-based car insurances are more popular and it is expected that nearly 40% of all car insurances will be telematic by 2020. [Ro13] In Germany, however, customers are still wary of usage-based insurances. Nevertheless, these insurances offer customers who belong to a high-risk group, like young male drivers, the opportunity to save money. We believe that explaining to customers how their individual risk is assessed by algorithms may help to increase acceptance for the assessment. Moreover, the customer could benefit from his own data, by getting advice on how to adapt behaviour in order to decrease insurance premiums.

Some insurances, like AXA Drivesave, already give feedback to their customers in form of scores between 0 and 100 in categories like “Smoothness” and “Calmness”. However, they give no explanation whatsoever how these scores are calculated. Not surprisingly, Braun et al. found out that this form of feedback is not perceived as helpful by drivers and they would prefer textual feedback. [BRS15] Moreover, in order to not only report, but (positively)

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influence behaviour, textual feedback is more useful and its psychology is well studied. [HT07]

2 Prototype

We have built a prototype (cf. [BRS15]) that follows the architecture for Data-2-Text systems described by Reiter [Re07], which consists of four stages: Signal Analysis, Data Interpretation, Document Planning and Microplanning and Realisation. For the Signal Analysis stage, we tried to mimic the algorithms used by insurance companies to create risk profiles for drivers. While their exact metrics are secret, we used the available information [Hä14] to get as close as possible. During Data Interpretation, we try to cluster incidents which lead to a reduced score (i.e. higher premiums) by features that can be understood by the customer and also give advice on how to change the behaviour in order to increase the score in the future. Figure 1 shows an example output text from the prototype. In a study we conducted, six drivers used the prototype over the course of one month. At the end of the study, all six drivers had reduced the number of speeding incidents per kilometre and for out of six drivers also reduced the number of acceleration incidents per kilometre and hence improved their driving score.

Driving Report 19 - 25 January

You drove **390 miles in 10 hours and 50 minutes** during the last week. You reduced the number of speeding incidents per mile by **more than 10 %**, well done!

You **accelerated or braked harshly 645 times**, mostly on **highways** and on **roads with 20 mph speed limit**. **Five times you drove more than 30 mph too fast**: On Castle Road, on Kirkton Road, on North Deeside Road and twice on A92. Going 30 mph slower could shorten your braking distance by 108 yards.

You also **speeded on 175** other occasions, 7 times on **roads with 20 mph speed limit** and 12 times **on weekends on roads with 30 mph speed limit**.

Fig. 1: Generated text

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