CS840 Project 6:

LSP Method for Sportbike Evaluation

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5-16-2016

Abstract – In the words of Kevin Cameron, “who are you? And, being who you are, what do you require from your motorcycle? Ask yourself,” and that is just the purpose of this paper (Cameron 8). There is a moment in everyone’s life where they are interested in purchasing a motorcycle, and many reasons can drive this decision. What motorcycle should they buy? Who is the buyer, what kind of motorcycle are they looking for, and what do they want to use it for? The motorcycle itself is a complicated multivariable system, and it is matched in complexity by the parameters of the buyer. The stakeholder in this case could be a 5’2” college girl looking for a suitable bike to get her to school, or a 6’1” AMA champion looking for a new ride to secure his next trophy with. Will the college student be satisfied with a 200 horsepower machine where, once astride, she cannot place both feet securely on the ground? This is not likely, nor is the Champion going to be satisfied with anything less than the fastest possible motorcycle. Everyone else is on a continuum, so the evaluation of the motorcycle must necessarily take into account its operator. This paper will propose a design of an evaluator for motorcycles using the LSP method, and a plan for diversifying this evaluator to adapt to the needs of varying stakeholders.

Introduction

For the purposes of our paper, we will consider the stakeholder to be an American man aged 25, of average height and weight. For that age, the average weight is 170 pounds, and the average height is 5’10”. By contrast, the weight and height of the average woman is 135 pounds and 5’5”, markedly lighter and shorter. This means a motorcycle with satisfies the physical requirements of the average man may not fit the average woman correctly. Furthermore, many other factors can play into the suitability of a motorcycle, such as its intended use, the environment in which it will be used, and how often it is used. The properties are all under the umbrella of ‘Stakeholder Properties’ which define who will use the motorcycle, what it will be used for and how, and why it will be purchased in the first place.

The LSP system itself is based around combining attributes with aggregators, to determine the resulting suitability of the system. Each individual attribute will have a percentage of suitability, based on how effectively it satisfies the needs of the stakeholder. An example of this would be an engine with 40 horsepower, which satisfies the basic necessity of having enough power to safely accelerate onto the freeway, but not much more. This motor, while sufficient for the needs of the road-going motorcyclist, lacks the power necessary for acceleration-based thrills. Thus, its degree of satisfaction is less than a more powerful engine.

Each attribute in the system must be as close to independent from the others as possible. Sometimes, this is not possible. For example, to capture a good idea of the power delivery of a motorcycle, both the power, and rpms of max torque are recorded. However, these values are somewhat correlated, as a more powerful racing engine will inherently have more torque delivery at higher RPM values. Regardless, these two values provide a very good idea of the character of the engine, and so they are sufficient for determining engine power delivery.

The attributes must be combined with aggregators, to determine the suitability of subsystems and, ultimately, the system as a whole. These aggregators combine the suitability of attributes according to their importance, and necessity to the system. Of course, properties like the weight of the bike are much more important than the color of the bodywork, so these attributes receive more weight in their corresponding aggregators.

An attribute may be necessary, sufficient, or optional, depending on the degree to which it must be present in the system in some satisfactory form. A bonus may be granted for the presence of an optional characteristic, but the system may not be penalized as harshly for the absence of an optional asset. A necessary attribute, on the other hand, must be satisfactory for the system to be considered suitable. An example of this juxtaposition is the fitting of a center stand on a motorcycle, versus extremely low horsepower output of the engine. A center stand is a good convenience, but its absence it not missed by the average rider. Conversely, an extremely low power output is considered to be dangerous on public roadways, as adequate acceleration can help the motorcyclist avoid unsafe situations. So, while a motorcycle without a center stand is still a good purchase decision, a motorcycle with very low horsepower would be harshly penalized.

References

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