Ontology-based Classification Software for Crimes and its Application in Femicide Cases

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Abstract

Femicide is a crime in which someone kills a woman because of her "womanhood" [1, 2, 3] and it is considered one of the cruelest and most extreme forms of violence against women [4]. The premise "womanhood" has generated controversy in the world of jurisprudence and law [5, 6]due to a common confusion about the two legal rights that femicide infringes: life, and the right to freedom to live without discrimination or violence based on gender stereotypes [7, 8]. This makes the classification of this crime complex. Due to the social misunderstanding around gender concepts [9], jurists often miss recognizing femicide cases [7, 10, 11]. This thesis proposes a legal classification software to support jurists in the decision-making process [12, 13]. We will investigate how the principle of explainability allows us to understand how data, models, algorithms, and results can clarify the exercise of justice.

The literature shows that some expert systems for legal classification are limited in the amount of information that they can handle [14, 15, 16, 17]. The introduction of machine learning (ML) techniques overcome the barrier of quantity without denting classification quality [18]. However, their focus on precision and accuracy creates other issues [19]. These systems are considered "black boxes", as they don't explain how and why they reach a decision [20]. Ultimately, the most efficient text classification algorithms such as deep learning algorithms are the least interpretable [21, 22, 23].

Legal systems must be explainable since they have a high impact on people's lives [24, 25, 26]. Explainability in ML systems can be achieved in three ways [27]: knowing how algorithm processes work locally; understanding the entire decision-making process globally; and, finally, the agnostic model, with an approximation to other explicable models ("glass boxes"), through their interpretability and transparency [28, 21, 29]. We expect that, from the agnostic explanation of the decisions of a software, it will be possible to know [28, 30, 31]: i) how the algorithms made the decisions, and ii) with the support of ontologies, "why" they made them. Our software requires contextual information, not only legal, but also relating to gender studies. This documentation is not structured, and transforming it in ontologies

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is time-consuming and complex [32, 33, 34, 35]. This is why we decided to use sophisticated techniques, such as deep learning, to automatically build ontologies that grant explanations of the legal decision-making process. In sum, using the methods of explainability to support legal decisions requires legal ontologies and social knowledge.

In conclusion, the application of ontologies developed using deep learning and natural language processing tools will allow us to obtain the benefits of both techniques. On the one hand, the precision of deep learning methods and, on the other, the transparency and interpretability of ontologies.

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