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# Reasoning criminal in detective novels by Argumentation theory

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Argumentation theory is a theory based on the arguments of human as a model. When people discussing about something, we refuse the partner's argument while presenting appropriate opinions from our own knowledge. A formal form of such arguments and attacks is the basic form of the argumentation theory. Since 1995 Dung proposed the abstract argumentation framework, the argumentation theory is developing rapidly. "Preference-based argumentation framework" (PAF), which is a argumentation theory that considers human preferences or priority of things, is proposed in 2002. It becomes possible to draw conclusions while considering the priority among laws and regulations in court controversy. In addition, the concept of "value" and "audience" was introduced, so that "value-based argumentation framework" (VAF) was proposed. As a result, even people who have the same knowledge, they may proved a different conclusion if their values differ or stand in the different position. In addition, since the argument possessed by the abstract argumentation framework is an abstract concept and there is no structure, a new argumentation framework called "assumption-based argumentation framework" (ABA) was proposed, which has the structured arguments. This argumentation framework has a deductive system, so it became possible to handle logical formulas in classical logic such as inference rules and hypotheses. In addition, there are argumentation models which have different knowledge, submit different conclusions from there, and have a conflicting relationship with each other, and based on that, a new argument theory was proposed. In this argument theory, it is not that different values are different from each other like VAF, because there is contradiction among knowledge owned by VAF. Therefore, it turns out that contradictory knowledge sets can be solved by using this argument theory. On the other hand, it is an important characteristic of the detective novels that all the information necessary for reasoning is written in the document, however, all the information is shown, we can not easily reach the truth. It is because that if all the information shown

in the detective story and common sense necessary for reasoning is set as one knowledge set, there is contradiction within this knowledge set and it is impossible to make the sole conclusion that "the culprit is somebody". In other words, doing reasoning in a mystery novel is the same as giving a conclusion from a contradictory knowledge set made in a detective story. Handling of inconsistent knowledge sets generally adopts a method of discarding knowledge with weak grounds by a method of finding a maximum contradiction knowledge set based on consistency, or a concept such as the basis of knowledge or the robustness of the basis. In this research, however, I use controversial theory to deal with inconsistent knowledge sets in mystery novels. By doing this, we will draw a conclusion that "who is the culprit". In my research, I propose a method to find inconsistent knowledge sets from detective stories, and get argument from there. It is to explore the criminal in the detective story by implementing a program that finds and eliminates contradiction of the knowledge sets. Also, contradictory knowledge sets from detective stories are special in comparison with common inconsistent knowledge sets. That is, in a mystery novel, it is a general truth that what was written in the text of the earth is true, so that knowledge converted by these is always true. In this research, I think that I can contribute to conditional argumentation theory research by research of such special argumentation. In the thesis, I introduce the argumentation theory which is the theoretical foundation of my research. And by using the theory, I found a way to reason the criminal in the novels. By using my program, I try to find the criminal of a detective novel called *The Theft at the English Provident Bank* written by Baroness Orczy. I can get the answer, but there are so many problems remain for the future.