Logical Foundation of Reasoning and Inference

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Abstract—A clear mind is a logical mind. This talk may make your mind clearer and, in the meantime, more confused. Not only do we elucidate the pillars of logic, which helps sharpen your logical thinking, but we also bring your attention to subtle logical fallacies in the hope of freeing your reasoning from such problems. An emphasis is on probabilistic reasoning, which forms the underpinnings of the entire scientific edifice. On the other hand, the talk may force you to puzzle over mind-boggling paradoxes rooted deeply in logic. We reveal one of the best kept and most shocking secrets: the fundamental law of inference, albeit a logical truth, can hardly be accepted by rational people, including you. We discuss an alternative in terms of random-set theorya powerful mathematical tool particularly promising for information fusion. Relevant developments in recent years are covered briefly. An attempt is made to drive home the point that a more down-to-the-earth logic than the existing deductive logic, which is ideal rather than realistic, should be developed.

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