Abstract

CAPTCHAs are employed on web systems for strengthen web security to protect from internet bots, fraudulent registration, spammers. So CAPTCHA is designed in such a way the patterns display on CAPTCHA feature that human can easily pass but hardship for automated approaches. Usability and security are two rudimental issues for CAPTCHA design and implementation. In Math calculus CAPTCHA test that be inherent with trigonometric and differential functions. Due to complexity of equations, user cannot easily solve expressions that possess poor usability of CAPTCHA. In this paper, a novel CAPTCHA design approach using Boolean algebra is present, to improve usability and security as contrast to Math calculus CAPTCHA. In this approach, logic gates will be design that depict shapes like OR, AND, NOR, NAND, NOR, etc. by use online digital library tool. Each gate executes a Boolean expression as represent by shape indicating operation. The shapes relate to the logic gates like conjunction, disjunction and complement. To prove human, user will identify shape of given logic gates and choose correct option that display in form of Boolean algebra for pass CAPTCHA test. From security issue, Boolean algebra CAPTCHA is non OCR based that provide no development in
advance technologies like AI and automated software.

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**Index Terms**

Computer Science  
Artificial Intelligence

**Keywords**

CAPTCHA, Boolean algebra, Math CAPTCHA, usability, security, bots