Automatic Smart Contract Generation Using Controlled Natural Language and Template

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Abstract— Smart contracts, which are widely recognized as key components of blockchain technology, enable automatic execution of agreements. Since each smart contract is a computer program that autonomously runs on a blockchain platform, their development requires much effort and care compared with the development of more common programs. In this paper, we propose a technique to automatically generate a smart contract from a human-understandable contract document that is created using a document template and a controlled natural language (CNL). The automation is based on a mapping from the document template and the CNL to a formal model that can define the terms and condition in a contract including temporal constraints and procedures. The formal model is then translated into an executable smart contract. We implemented a toolchain that generates smart contracts of Hyperledger Fabric from template-based contract documents via a formal model. We then evaluated the feasibility of our approach through case studies of two types of real-world contracts in different domains.