

Code Generation using Transformer Models

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Abstract: *Code generation, the task of automatically producing source code from natural language descriptions or partial code snippets, has seen significant advancements with the introduction of Transformer-based models. Unlike traditional rule-based or statistical methods, Transformer models leverage self-attention mechanisms and deep learning to better understand context, syntax, and semantics, thereby generating more accurate and human-like code. This paper explores the evolution of code generation, emphasizing the pivotal role of Transformer architectures such as GPT, Codex, and CodeT5. We discuss how these models are trained on massive code corpora, enabling them to perform tasks like code completion, translation between programming languages, and automatic bug fixing. Moreover, we highlight their application across various domains, from software development to educational tools, while analyzing the challenges including syntactic errors, logical inconsistencies, and ethical concerns like code plagiarism. The study also sheds light on ongoing research aimed at enhancing model efficiency, interpretability, and domain adaptability. Overall, Transformer models represent a transformative approach to automating coding tasks, holding great promise for the future of intelligent software engineering.*

Keywords: Code Translation, Transformer Models, Natural Language Processing, Code Generation, GPT Models, Code T5

