SupportLess: Software Searching for Optimal Support Orientation in 3D Printing

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The purpose of this project was to develop software that reduces production costs and improves efficiency by optimizing support for 3D printing. Support referred to a structure to prevent the models from collapsing in 3D printing. However, excessive support caused problems such as waste of materials, deterioration of completeness, and increase of output time. Therefore, we divised a software to reduce support by determining the output direction of the model. Our project explored the optimal angle through a genetic algorithm. Previous studies have considered the number of slices and copper wire according to the angle, but had a limitation that it did not reflect the actual output possibility. Our project analyzed the properties of the 3D model by combining Finite Element Analysis (FEA). The possibility of output failure was measured according to the stress between the floor and the model, excluding the impossible output angle. As a result of the test, support and time were reduced by 20% compared to before angle adjustment. For 30 models, the output success rate was 96%. Our project can contribute to the development of the 3D printing industry by reducing cost and time.

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