With the advent of deep learning techniques, demand for large amounts of training data has been increasing ever since. While large benchmark repositories for 3D data do exist (like ShapeNet [1] and ModelNet [2]) and contain annotated CAD models, most models in these datasets have intersecting triangles (do not follow Euler characteristics). This non-manifold behaviour of models restricts their application and such models are not suitable for 3D printing, mesh deformation, remeshing, etc.

A heuristic approach to convert a CAD model to triangulated 2-manifold mesh involves voxelization then finding a boundary volume from these voxels. This approach is highly sensitive to voxel grid resolution, mesh volume parameters and occasionally results in meshes with overlapping triangles. Other techniques often generate meshes with holes or multiple non-connected components. Objective of this project would be to develop a robust framework for converting CAD models to 2-manifold meshes, where the above stated methods could serve as the starting point.

Tasks:
- Literature research
- Fine-tuning of existing approaches
- Development of the framework and its evaluation on large datasets

Requirements:
- Good programming skills (e.g. C++, Matlab, Python)

Recommendations:
- Prior knowledge in Computer Vision and/or Computer Graphics (e.g. attendance in PCV/ CG2)

Language: English

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References: