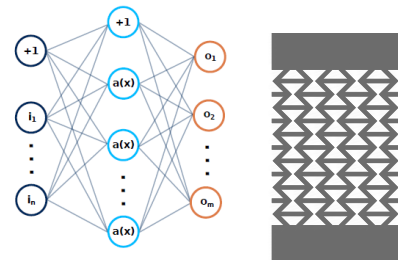


Final thesis

Generative Networks for Designing Auxetic Materials Maximizing Poisson Ratio

6. Juli 2023

Auxetic materials have an extraordinary property: when stretched, they actually expand perpendicular to the applied force, unlike conventional materials that contract in that direction. This counterintuitive behaviour, which corresponds to a negative Poisson's ratio, is due to their intricate internal structure and offers numerous advantages in various applications including protective equipment, biomedical engineering, energy absorption and impact mitigation. This thesis proposal aims to leverage generative networks to design and fabricate auxetic planar structures with a focus on maximizing the Poisson ratio. The proposed research will involve investigating existing studies, defining appropriate boundary conditions, designing auxetic structures using generative networks, and manufacturing the final prototypes through 3D printing.



- ▶ Research existing investigations on auxetic materials and generative networks.
- ▶ Train generative networks to design auxetic structures with maximum Poisson's ratio.
- ▶ Utilize 3D printing technology to manufacture the designed auxetic prototypes.
- ▶ Validate predicted Poisson's ratios with mechanical testing on created prototypes.
- ▶ Perform comparative analysis between predicted and experimental results to evaluate the effectiveness of the generative network approach.
- ▶ Summarize findings, discuss implications, and suggest future research directions.

By exploring the capabilities of generative networks in designing auxetic materials and utilizing 3D printing technology for fabrication, this thesis aims to contribute to the field of materials science and engineering by offering new possibilities for creating advanced materials with enhanced mechanical properties.



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