

# Improving Solar Cell Metallization Designs using Convolutional Neural Networks

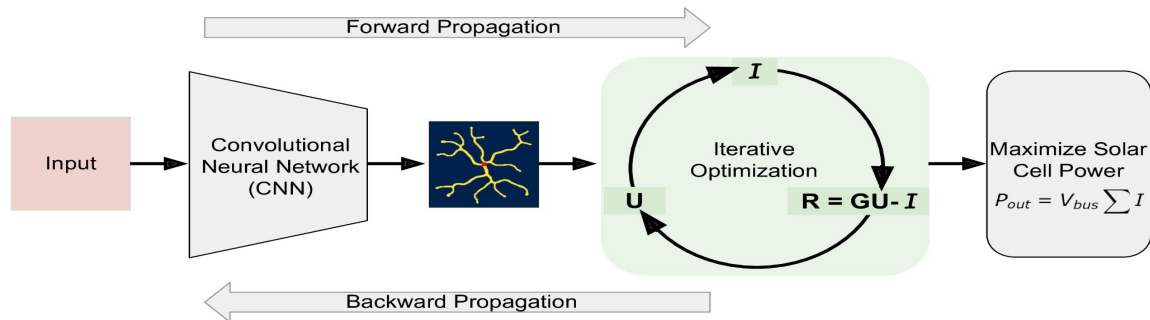
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(SimDL)

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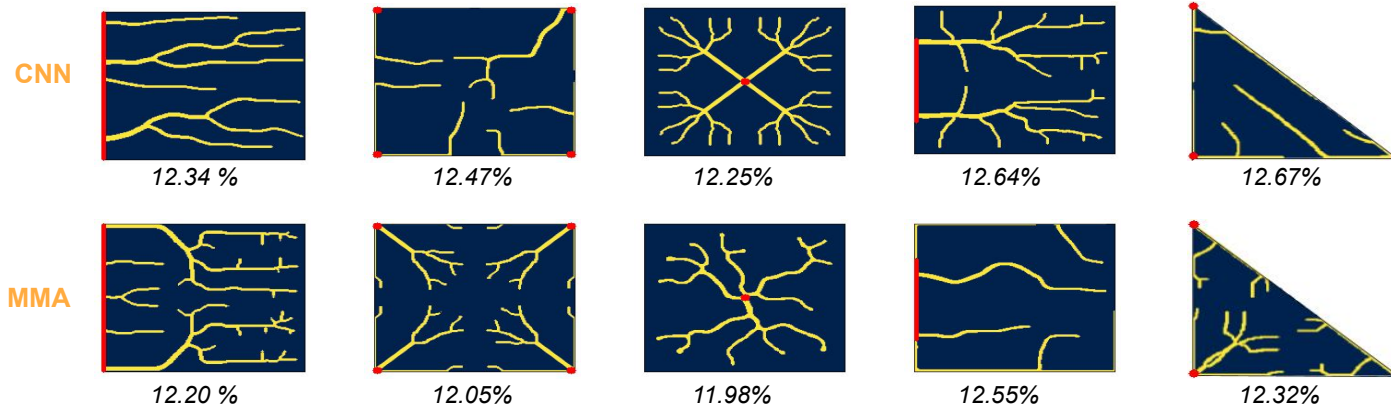
## Overview

- **Topology Optimization** - Used to design unconventional complex metallization patterns for solar cells leading to better efficiency of output.
- **SolarNet** - a CNN based reparameterization scheme that can be used to obtain improved metallization designs.
- **Modification of optimization domain** - Rather than optimizing the electrode material distribution directly, the weights of a CNN model are optimized.
- SolarNet improves the performance of solar cells compared to the traditional TO approach.

## Schematic Workflow



## Experimental Results



## Conclusion

- **SolarNet** - Optimizing directly the weights of CNN and generating the topological design of the front metallization as its output.
- Improvement of performance of solar cells over the standard topology optimization scheme.
- Deep learning strategies such as CNN, exhibit **potential for physics based optimization** problems.