

Master Thesis / Bachelor Thesis / Advanced Seminar



Technische Universität München



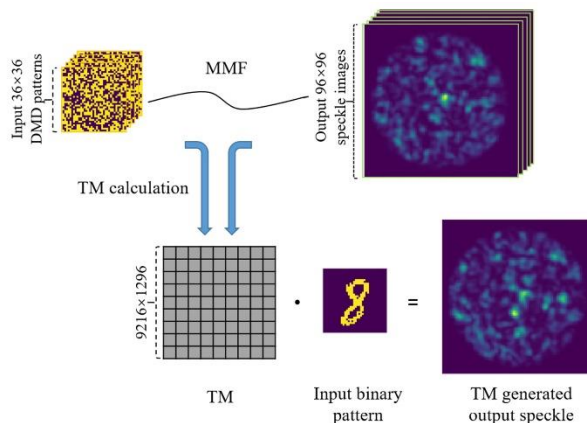
Fakultät für
Elektro- und Informationstechnik
Lehrstuhl für
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Imaging through the multimode fiber with neural networks

Background

Multimode fiber is remarkably capable of delivering information via thousands of modes. For example, a commercial MMF with a 62.5 μm core diameter can support approximately 4500 spatial modes at a specific wavelength, which in principle transmit an image with roughly the same number of pixels. Therefore, compared to fiber-bundled cables (a bundle of single-mode fibers), one multimode fiber can transfer the same amount of information and is relatively more optimal for applications such as endoscopy.

However, the image at the fiber output appears as a speckle pattern because the different propagation velocities of each mode lead to an amplitude and phase mixing of the image. However, the image at the fiber output appears as a speckle pattern because the different propagation velocities of each mode lead to an amplitude and phase mixing of the image. To unscramble the speckle patterns, neural networks are applied in recent years.



Pengfei Fan, Tianrui Zhao, and Lei Su, "Deep learning the high variability and randomness inside multimode fibers," Opt. Express 27, 20241-20258 (2019)

Scope

This topic may include some tasks as literature research, setting up the measurement system, image processing with neural network and data analysis.

If you are interested for more details, please send an email to: kun88.wang@tum.de

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