# Article information:

精细复合多尺度排列模糊熵在静息态fMRI信号中的应用--《太原理工大学》2021年硕士论文  
<https://cdmd.cnki.com.cn/Article/CDMD-10112-1021806223.htm>

# Article summary:

1. This article proposes a new method, Refined Composite Multiscale Array Fuzzy Entropy (RCMPFEN), to improve the accuracy and stability of multi-scale permutation fuzzy entropy when analyzing non-stationary signals.

2. The test-retest reliability of RCMPFEN was analyzed using two sets of fMRI signal retest data sets (NYU data set andIBA data set). The results showed that the test-retest reliability of RCMPFEN is better than that of MPFEN in three aspects.

3. Application of MPFEN and RCMPFEN to the analysis of fMRI signal complexity in patients with bipolar disorder (BD) showed that more different brain regions were found at high scales, reflecting abnormal brain activity in BD patients.

# Article rating:

May be slightly imbalanced: The article presents the information in a generally reliable way, but there are minor points of consideration that could be explored further or claims that are not fully backed by appropriate evidence. Some perspectives may also be omitted, and you are encouraged to use the research topics section to explore the topic further.

# Article analysis:

This article presents a new method for analyzing non-stationary signals, Refined Composite Multiscale Array Fuzzy Entropy (RCMPFEN), which is proposed to improve the accuracy and stability of multi-scale permutation fuzzy entropy. The test-retest reliability of RCMPFEN was analyzed using two sets of fMRI signal retest data sets (NYU data set andIBA data set). The results showed that the test-retest reliability of RCMPFEN is better than that of MPFEN in three aspects. Application of MPFEN and RCMPFEN to the analysis of fMRI signal complexity in patients with bipolar disorder (BD) showed that more different brain regions were found at high scales, reflecting abnormal brain activity in BD patients.

The article appears to be reliable as it provides evidence for its claims through testing on two datasets, NYU dataset andIBA dataset, which shows that the proposed method has improved accuracy and stability compared to existing methods. However, there are some potential biases present in this article such as lack of exploration into counterarguments or alternative explanations for the findings presented here, as well as lack of discussion on possible risks associated with this method or any potential limitations or drawbacks associated with it. Additionally, there is no mention about how this method could be applied to other types of neural signals or how it could be used for other purposes beyond analyzing fMRI signals from BD patients. Furthermore, there is no discussion on how this method could be further improved or what future research directions could be taken based on these findings.

# Topics for further research:

* Alternative explanations for fMRI signal complexity
* Risks associated with Refined Composite Multiscale Array Fuzzy Entropy
* Limitations of Refined Composite Multiscale Array Fuzzy Entropy
* Application of Refined Composite Multiscale Array Fuzzy Entropy to other neural signals
* Improvements to Refined Composite Multiscale Array Fuzzy Entropy
* Future research directions for Refined Composite Multiscale Array Fuzzy Entropy

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