

DeepSF: Deep CNN for mapping protein sequences to folds

Zhiyang's presentation about [1]

Zhiyang Ong

Department of Electrical and Computer Engineering
Dwight Look College of Engineering,
Texas A&M University
College Station, TX

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- ① Problem and Knowledge Gap
- ② Proposed Solution(s)
- ③ Experimental Results
- ④ Discussion and Muddy Points

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Context of the Problem

Background Information

Context of the problem.

- ① The structures of most ($> 99\%$) proteins are unknown
- ② Protein fold recognition enables us to associate a protein sequence to a protein fold
 - With this protein fold, determine its protein structure
 - With this protein structure, determine its protein function
 - [Osadchy2011,OConnor2010]
 - [OConnor2014a, From Contents: Unit 2, How Do Cells Decode Genetic Information into Functional Proteins?: §2.4 The Functions of Proteins Are Determined by Their Three-Dimensional Structures]
 - [OConnor2014, From Contents: Unit 2, How Do Cells Decode Genetic Information into Functional Proteins?: §2.4 The Functions of Proteins Are Determined by Their Three-Dimensional Structures]
 - DOIs: 10.1006/jmbi.1999.2661
 - <https://www.nature.com/scitable/ebooks/essentials-of-cell-biology-14749010/122996920/>



Problem Definition

What is the problem that [1] is solving?

Problem description.

- ① Sequence-alignment methods for mapping protein sequences to protein folds are indirect
 - Can't explain relationship between protein sequences & protein folds
- ② Protein fold recognition enables us to associate a protein sequence to a protein fold
 - With this protein fold, we can determine its protein structure
 - With this protein structure, we can determine its protein function
 - DOI:10.1073/pnas.1102727108
 - <https://www.nature.com/scitable/ebooks/essentials-of-cell-biology-14749010/122996920/>
 - <https://www.nature.com/scitable/ebooks/cell-biology-for-seminars-14760004/122995569/>
 - DOI:
 - <https://www.ncbi.nlm.nih.gov/books/NBK21177/>
 - DOI:10.1006/jmbi.1999.2661



Problem Importance

Why is it important?

Why is this problem important?

- This facilitates protein structure prediction
- Protein structure prediction enables protein function prediction

- Knowing about protein function facilitates: **Insert
References!!!**

- drug/medication design
- biotechnology
- synthetic biology
- personalized/precision medicine

What are the Knowledge Gaps in [1]?

How would [1] address these knowledge gaps?

List of knowledge gaps:



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Proposed Solution(s) - 1

What do they proposed to address the knowledge gap?

Proposed Solution(s).



Proposed Solution(s) - 2

What do they proposed to address the knowledge gap?

Proposed Solution(s).



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Experimental Results - 1

How do their proposed solutions compare with existing solutions?

Experimental Results - 1.



Experimental Results - 2

How do their proposed solutions compare with existing solutions?

Experimental Results - 2.



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Discussion of Experimental Results

What do the experimental results tell us?

Discuss the experimental results.





Muddy Points

What do I not understand about [1]?

What do I not understand about [1]?



References

-  Jie Hou, Badri Adhikari, and Jianlin Cheng.
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Bioinformatics, 34(8):1295–1303, April 15 2018.
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Available online from *Springer Nature Group: Nature Research: Nature Education: Scitable: Library: eBooks: Cell Biology* at: <https://www.nature.com/scitable/ebooks/cell-biology-for-seminars-14760004/>; March 25, 2020 was the last accessed date, January 17 2014.

