

## Additional paper for “RNA Finding”

### Paper reference

Zasha Weinberg and Walter L. Ruzzo. “Sequence-based heuristics for faster annotation of non-coding RNA families.” Bioinformatics, Volume 22, Number 1, Pp. 35-39

### Abstract

Weinberg and Ruzzo present a profile-HMM implementation of the Maximum Likelihood (ML) heuristic filter to reduce the search space for non-coding RNAs. The ML filter falls under the broader category of Covariance Model (CM) based filters.

### Summary

The method involves creating a profile HMM grammar by taking an MSA used to create a CM and removing the secondary structure (base-pair annotations) and using the CM creation method described in their previous paper (Weinberg and Ruzzo, 2004). Once the profile HMM is created, probabilities are assigned in such a way that it is as similar as possible to the CM. The profile HMM will then be used as a filter to reduce the search space of ncRNAs.

The authors go on to describe a novel methodology to analyze various filters using real biological data. The method involves comparing the various heuristic methods in terms of speed and sensitivity.

Finally, the authors compare their Maximum Likelihood (ML) heuristic filter to other heuristic filters such as BLAST-based (Altschul et al, 1997) filters and tRNAscan-SE (Lowe and Eddy, 1997), and goes on to show that their filter has a superior accuracy when there are not many known members in a particular family.

### Discussion

The paper describes a different approach to filter the search space for non-coding RNAs as presented in the lecture. The authors claim that their method is an advancement over existing CM heuristic filters in terms of accuracy when there are not many known members in a particular family. In addition, the main advantages of their method are:

1. It is generic – the filter can work for any ncRNA family
2. It is sensitive and fast
3. It is able to trade sensitivity for speed, if computational resource is limited
4. It can be easily adapted to technological improvements – their filter will not be invalidated by a better Covariance Method (CM) technology.