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A reference implementation of

Introduction

The coexistence of specialists and generalist within ecological communities is a long-standing question. **wils94csg** have suggested that this coexistence can be understood when examined in the light of (i) differential fitness loss associated to specialism, (ii) active habitat selection, (iii) negative density dependence due to competition, and (iv) stochastic changes in habitat quality, that allow combinations of species to persist even though coexistence would not be possible in a purely deterministic world. Here I propose an implementation of this model in *Julia* [**beza17jfa**], and show that it is able to reproduce most figures from the original manuscript.

The **wils94csg** model describes three species across two patches of habitat. Species 1 is a specialist of habitat 1, species 2 is a specialist of habitat 2, and species 3 is a generalist. This results in the maximum density that these species can reach in both habitats:

$$\mathbf{K} = K_1 a K_1 a_K 2 K_2 b K_1 b_K 2\,. \tag{1}$$

In this matrix, K_1 is the quality of habitat 1, K_2 is the quality of habitat 2, a is the fitness cost of the specialist in its non-optimal environment, and b is the fitness cost of generalism. Note that $1 > b > a > 0$.

Species distribute themselves across habitats in a way that minimizes the negative effect of other species on their fitness. This is modelled by each species having a value p_i, which is the proportion of its species choosing habitat 1. Values of $\mathbf{p}$ are found by measuring the negative density effect of each species in each habitat:

$$D_{l1} = \frac{\sum_{i\in l,m,m} p_i N_i}{K_{l1}} \tag{2}$$

and

$$D_{l2} = \frac{\sum_{i\in l,m,m} (1-p_i) N_i}{K_{l1}}\,. \tag{3}$$

To find a value of p_l, we fix p_m and p_n, and iterate over $p_l \in [0;1]$, to find the value of p_l minimizing $|D_{l1} - D_{l2}|$. This procedure is repeated about 20 times.

Methods

The methods section should explain how you replicated the original results:

- did you use paper description
- did you contact authors ?
- did you use original sources ?

Figure 1: Figure caption

- did you modify some parts ?
- etc.

If relevevant in your domain, you should also provide a new standardized description of the work.

Results

Results should be compared with original results and you have to explain why you think they are the same or why they may differ (qualitative result vs quantitative result). Note that it is not necessary to redo all the original analysis of the results.

Conclusion

Conclusion, at the very minimum, should indicate very clearly if you were able to replicate original results. If it was not possible but you found the reason why (error in the original results), you should exlain it.

Table 1: Table caption {#tbl:table}

Heading 1			Heading 2		
cell1 row1	cell2 row 1	cell3 row 1	cell4 row 1	cell5 row 1	cell6 row 1
cell1 row2	cell2 row 2	cell3 row 2	cell4 row 2	cell5 row 2	cell6 row 2
cell1 row3	cell2 row 3	cell3 row 3	cell4 row 3	cell5 row 3	cell6 row 3

A reference to table **tbl:table**. A reference to figure **fig:logo**. A reference to equation **eq:1**. A reference to citation **markdown**.

$$A = \sqrt{\frac{B}{C}}$$

{#eq:1}