

Peer Review

Review of: "Active Matter Flocking via Predictive Alignment"

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Report of manuscript titled "active Matter Flocking via Predictive Alignment"

In the current manuscript, the authors have compared the work of Flocking Via Predictive Alignment with the standard Vicsek model with periodic boundary conditions. The model uses the predictive alignment strategy, which leads to a cohesive flock without any attractive interaction. I found the work interesting and useful for the active matter community. However, the work and writing need to be improved before it gets published. Below are my comments on the work.

1. I find the model very useful for crowd dynamics or for intelligent agents. Hence, in the introduction, a few lines should be added to motivate the possible examples of real systems where the model is useful.
2. In Fig. 1 (b), the schematic of the model is not very clear. It should be drawn more clearly and discussed in detail.
3. The same applies to the text about the explanation of the model given by equations 1, 2, and 3. The writing should be revised. The text is not very clear for a new reader.
4. The system size the authors have chosen is really small, $N=200$, and some of the results are generated for $N=500$. Some system size analysis for $N=1000$ agents would be useful for the stability of the results with respect to system size. Also, what is the steady-state feature of the system? Does the flock remain cohesive at late times also for noise below the critical value? I suggest including a late-time animation, which would be useful, and the same can be supported with the time series plot of observables as shown in Fig. 2.
5. The five or seven values of angles chosen for the interaction, as shown in Fig. 1(a), are very much like the Vision angle mechanism as shown in [PHYSICAL REVIEW E 92, 032716 (2015)] and many other works

with the same group.

Hence, I suggest some of these works can be cited and discussed for comparing the model proposed in the current manuscript with the model based on the Vision angle.

6. Fig. 4 looks like it was plotted in a hurry, and the labels of the insets are missing. Also, the information given in the upper panel figures is not very clear. Hence, the presentation and text of the caption of the figure should be revised.

7. The same is true for Fig. 5 as well. The discussion of the $\Delta \rho$ is not very well motivated or discussed.

8. Some comment on the system properties, if instead of looking for neighbors on the front side within some narrow angle range, the agent looks in the full circle, and also if the angles are continuous. Whether the cohesive nature of the flocking remains as we make the angle continuous or the agent starts to look in the full circle.

Some comments are needed, which will expand the applicability of the model for the general case.

Attachments: available at <https://doi.org/10.32388/NKDX0Z>

Declarations

Potential competing interests: No potential competing interests to declare.