Exploring Combinatorial Domains and the Relationships Amongst Them

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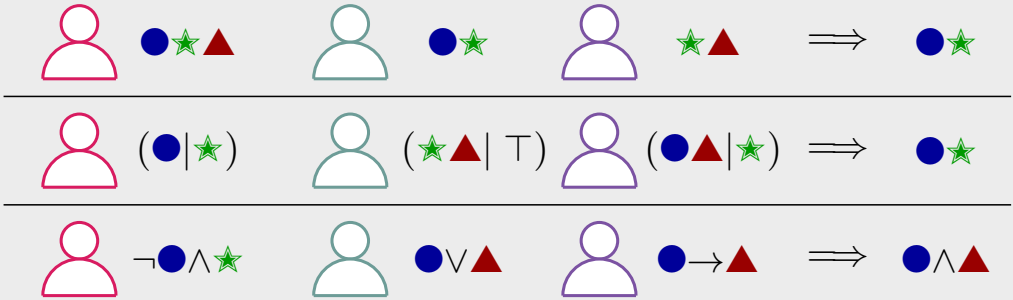
Combinatorial Domains

SETTING: Collective decision making scenarios where the set of alternatives have some kind of combinatorial structure.



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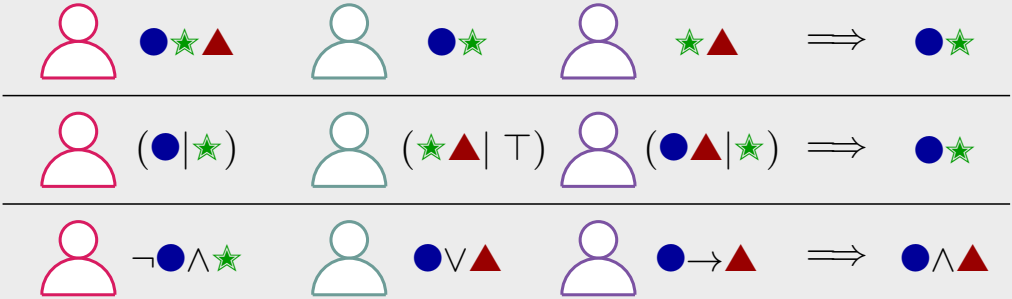


How to begin exploring this vast setting and its challenges?

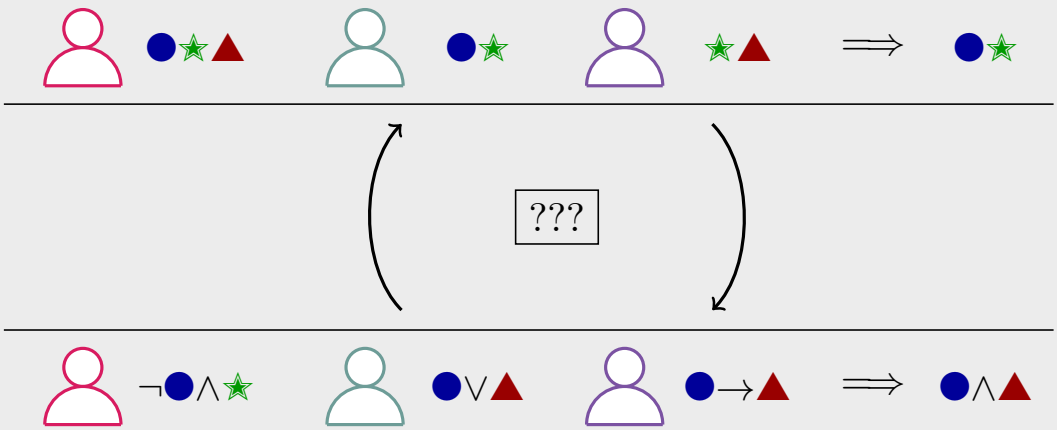
Starting Point

GOAL: Develop combinatorial models with the following in mind:

- **Application**: Can general models be applied to several tasks?
- **Communication**: Lessen the agents' efforts in stating preferences.
- **Expressivity**: Allow agents to state as much as possible over their preferences.
- **Computation**: Use of models should be efficient for practical implementation.

Moving beyond new models?

Relating Combinatorial Models



Relating Combinatorial Models

Relate models to provide insight into their qualities and/or drawbacks?

IDEA: Judgment Aggregation (JA) as a tool for analysis.

Potential avenues to explore using JA:

- Multiwinner rules as done for single-winner voting rules and participatory budgeting.
  - Develop multiwinner rules with certain properties?
- Models for conditional preferences with candidates including:
  - Conditional Approval Voting and CP-Nets.

GOAL: Build on such results to study combinatorial frameworks.

Moving Forward

In the immediate future:

- Compact representation for agents' preferences over election outcomes.
- Transfer multiwinner voting principles, such as proportionality, into JA.

Thank You!