EvoChef: Show me What to Cook!

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Motivation

- Culinary arts combines taste, texture, aroma, and health
- Depends on individual Culture and Climate
- Regional Food
- Ethnic Preferences

Challenges

• Evaluation of Recipes

• Detection of invalid cooking method or instruction

• State of ingredients (raw meat Vs boiled rice)

• Varying cooking methods for different ingredients

Can we combine foods from different regions and automatically evolve new recipes?

Initial Population

- Recipes randomly selected from multiple cooking websites including Yummly.com, Allrecipes.com, Recipes-plus.com, Genusktchen.com, Simplyrecipes.com, Omnivorescookbook.com, and Greenevi.com.
- Data consists of American, Italian, Spanish, Hungarian and Chinese recipes.
- Steps and ingredients of these recipes were combined to create initial solutions

Fitness evaluation

- User Ratings
- Collected at http://www.machinegeneratedrecipes.de

Selection

- Tournament Selection

Mutation

- Substitute selection

Recipe Representation

| Component	Description
Main ingredient	The main ingredient is a major ingredient of a recipe, for example, rice in all type of rice dishes
Side Ingredient	Side ingredients are all the ingredients used in the recipe other than the main ingredient.
Spice	The spice is a type of side ingredient used to add flavor to food.
Step	Steps compose the cooking instruction.
Recipe Properties	name, time, servings, category, type
Ingredient Properties	name, quantity, unit, main/side ingredient, spice, used-in

- Property Graphs
- Nodes
  - Ingredients
  - Instructions
- Edges
  - Procedure
- Recipe (root)
- Finished (leaf)
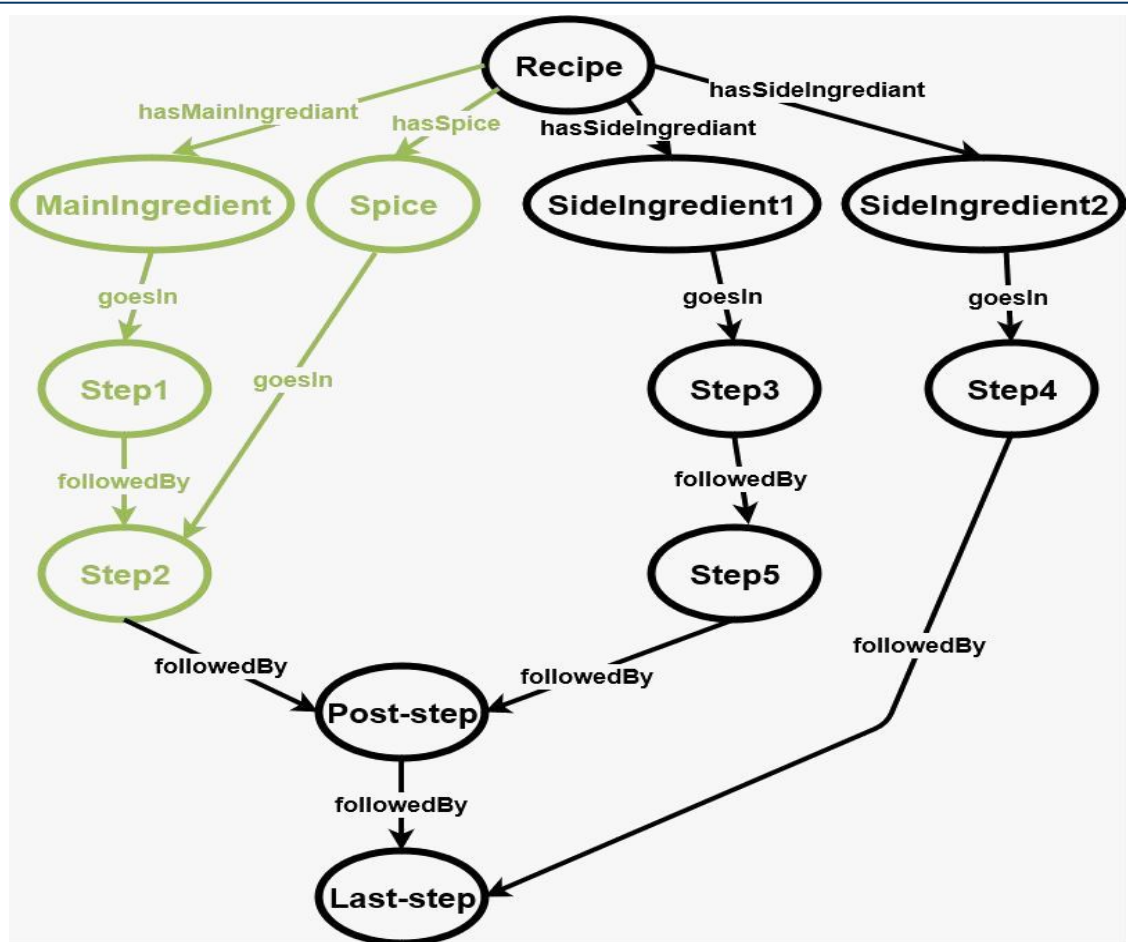
Crossover
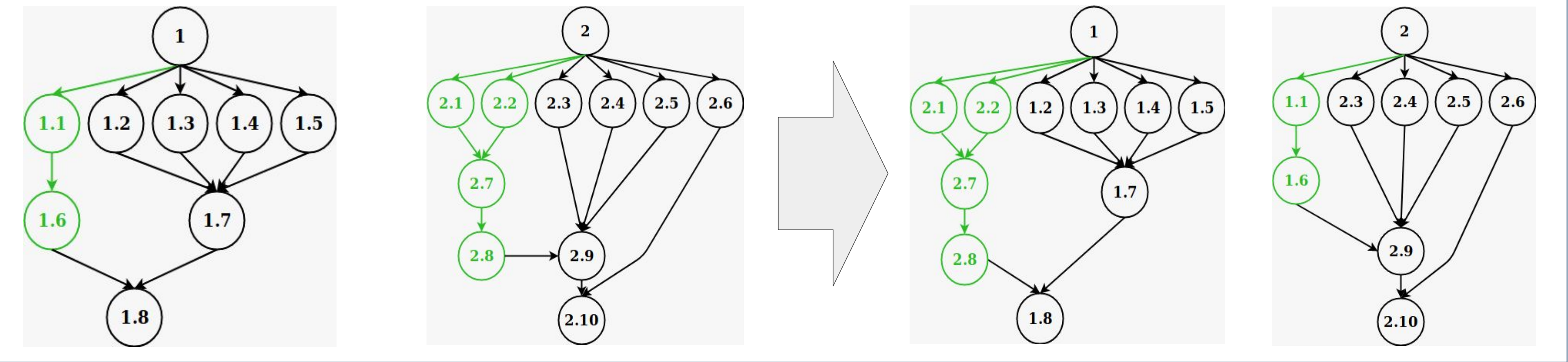
Resulting Recipes

Glazed Sweet Potatoes with parmesan cheese

Ingredients:

- butter, milk, salt, parmesan cheese, sweet potatoes

Instructions:

1. Peel the sweet potatoes and cut them into 0.5 inch to 1-inch thick slices. Place the sweet potato slices in a saucepan and cover with water. Bring to a boil and cook for about 12 minutes, or until just tender.
2. Mash with the butter, milk, and salt
3. Stir in the parmesan cheese.

Mashed Red Potatoes With brown sugar And butter

Ingredients:

- red potatoes, garlic cloves, brown sugar, water, butter, salt

Instruction:

1. Put potatoes and garlic in large pan. Cover with water. Bring to a boil.
2. Reduce heat and simmer for 25 minutes, until potatoes are tender. Drain well.
3. In a heavy skillet, combine brown sugar, water, butter, and salt. Simmer over low heat for 5 minutes.
4. Add the sliced potatoes to the brown sugar mixture. Simmer for 10 minutes, or until well glazed, turning frequently to keep them from scorching.

Results
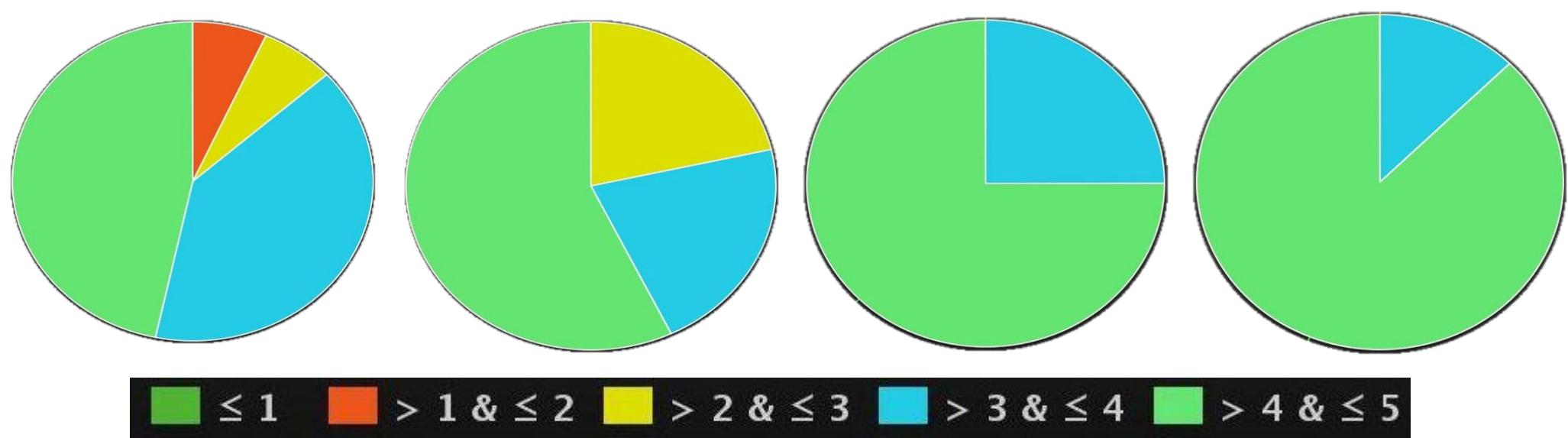
Fitness(rating) of recipes in each generation

Novelty

Blind Comparison of recipes

Original	EvoChef	Equal	I do not know
36.9%	59.2%	1.9%	2%

References

1. https://www.yummly.com
2. https://www.allrecipes.com
3. http://recipes-plus.com
4. https://www.geniuskitchen.com
5. https://www.simplyrecipes.com
6. https://omnivorescookbook.com
7. http://greenevi.com

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