**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**
- 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](http://www.machinegeneratedrecipes.de)

**Selection**
- Tournament Selection

**Mutation**
- Substitute selection

**Recipe Representation**

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

**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
- Instructions:
  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**

**Blind Comparison of recipes**

<table>
<thead>
<tr>
<th></th>
<th>Original</th>
<th>EvoChef</th>
<th>Equal</th>
<th>I do not know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fitness(rating) of recipes in each generation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**References**
1. [https://www.yummly.com](https://www.yummly.com)
2. [https://www.allrecipes.com](https://www.allrecipes.com)
3. [http://recipes-plus.com](http://recipes-plus.com)
4. [https://www.geniuskitchen.com](https://www.geniuskitchen.com)
5. [https://www.simplyrecipes.com](https://www.simplyrecipes.com)
6. [https://omnivorescookbook.com](https://omnivorescookbook.com)
7. [http://greenevi.com](http://greenevi.com)