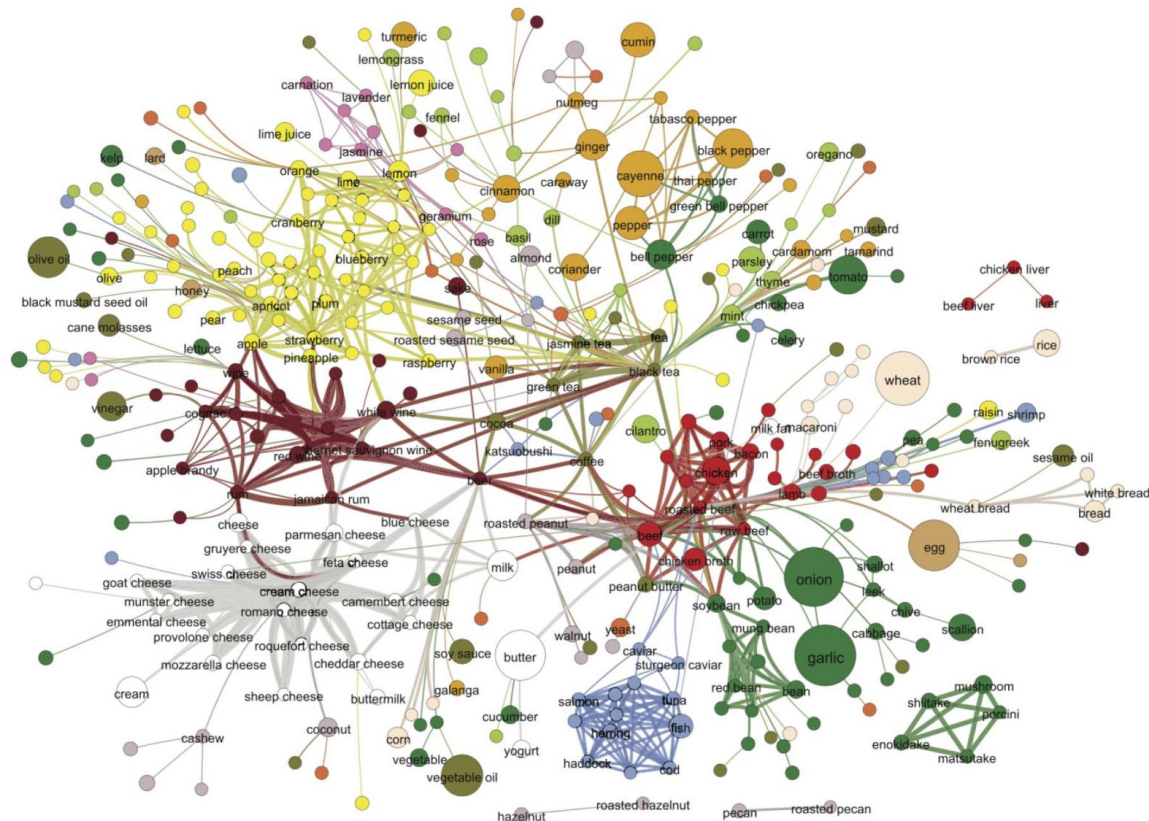**Project: Visualization of food ingredients by cuisines and clusters**

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Purpose: create food visualization in the form of social network which would demonstrate connections between various food ingredients

Table 1: Food ingredients social network illustration

Users

The visualization can be used for the study of world cuisines, finding interesting food combinations and creating new dishes. Therefore, the main types of users would include members of the general population who are interested in exploring world cuisines and aspiring gourmands, as well as amateur chefs and food classifiers.

Tasks

The tasks a user will be undertaking when using the site include exploration of cuisines and recipes. This can be done from a starting point of cuisines -- selecting a color coded area of the graph or selection of a cuisine from a drop down list and drilling down into the ingredient relationships, ultimately identifying recipes that exemplify those food groups. This will allow an

investigative user to learn about a particular cuisine and how the principal ingredients relate to one another. We view this task as primarily exploratory on the part of the users.

Another task we would like the user to be able to accomplish is comparing cuisines to one another. This would require a different type of visualization that shows the overlap in primary ingredients between cuisines, and would allow the user to build an awareness of food culture and patterns of cuisine relationships between regions.

Both of the above tasks use cuisine as the starting point for exploration and comparison. Some other types of possible results would include patterns of food choice within a cuisine and suggestions for foods representing "typical" dishes from that cuisine.

We would also like to provide users with the opportunity to begin with one, and possibly more, ingredients and explore the relationship of that ingredient to the various cuisines it or they are a part of. Based on world recipes dataset we are going to implement the following:

1) Select core ingredients, in general, and by cuisines
2) Create subset foods social network based on recipes, or ingredient "clusters". The users would be able to see which food ingredients often go together, how it differs in cuisines. The user would be able to find most popular combinations and some unusual combinations. We also expect to see clusters, e.g. drinks, meat dishes, dishes with noodles, desserts
3) (Optional) Suggest additional ingredients to user based on initial ingredient subset, by type. For example a popular request might be which spices go with what type of meat and vegetables. A user selecting a short list of ingredients would be able to see which cuisines that combination appears in and then, based on the selection of cuisine, find other ingredients or recipes that would complement their starting point.

Visualization approach:

Visualization would be based on World Recipes Dataset: [Recipe ingredient Dataset](). The dataset contains 37K entries with information on dishes, including:
- Cuisine
- Ingredients

We have transformed the initial dataset into an ingredients matrix showing connection strength between each pair of ingredients: general matrix and top cuisines matrices. These matrices further would be built into social networks. There are 7,000 unique ingredients overall in the dataset and 20 cuisines. We assume that we will build the visualization for top 5-7 cuisines and use only around top 500 ingredients for visualization of each cuisine. If we can, we will let the user define the detalization level of the chart, ie # of ingredients to be displayed.

Table 2: Food ingredients matrix structure (value - # of times the ingredients go together in dishes of particular cuisine, diagonal - # of times the ingredient is present in particular cuisine dishes)

ingredient	salt	sugar	onions	all-purpose flour	sour cream	eggs	water	butter	unsalted butter	large eggs	...
sugar	87	155	15	51	33	52	37	36	41	31	...
onions	101	15	145	17	49	22	42	34	14	15	...
all-purpose flour	89	51	17	123	25	31	26	29	52	56	...
sour cream	77	33	49	25	117	25	24	28	18	16	...
eggs	75	52	22	31	25	112	20	41	11	0	...
water	68	37	42	26	24	20	111	22	16	15	...
butter	70	36	34	29	28	41	22	104	3	11	...
unsalted butter	59	41	14	52	18	11	16	3	93	48	...
large eggs	60	31	15	56	16	0	15	11	48	85	...
carrots	47	5	44	2	28	5	22	18	3	1	...
vegetable oil	53	18	24	29	17	22	12	15	11	20	...
milk	50	42	5	25	10	39	10	26	18	11	...
potatoes	50	7	38	7	25	16	24	19	0	3	...
flour	43	44	11	2	20	42	10	27	6	2	...