Abstract

Cultures across the world have evolved diverse culinary repertoires that form an integral part of their identity. Traditional recipes have been shaped to incorporate ingredients driven by their taste and health considerations. The study of culinary practices has hitherto been mainly under the purview of humanities and social sciences. In this thesis, we take a computational gastronomy approach to conduct a data-driven investigation of traditional Indian recipes to study the basis for their flavor composition and health impact of culinary herbs and spices.

The first part of the thesis explores the basis of flavor in Indian Cuisine through the principle of food pairing applied to its traditional recipes to show what ingredient combinations are generally followed in a typical Indian recipe and its regional cuisines. The study provides a basis for designing novel signature recipes, healthy recipe alterations and recipe recommender systems. Further, the thesis presents a repository of flavor compounds, FlavorDB, a comprehensive database for the exploration of flavor compounds in food ingredients. The latter and final sections of the thesis unearth the health significance of key dietary ingredients, spices and herbs from data available via published biomedical literature. By carrying out a data analytical approach, the thesis provides valuable insights into their therapeutic utility. Further, by integrating spice-phytochemical-disease associations, we identify bioactive spice phytochemicals potentially involved in their therapeutic effects. The results and data from this investigation are compiled and presented in the database SpiceRx.

In summary, we take a data-driven approach to investigate the data of traditional Indian recipes to identify culinary fingerprints of its regional cuisines. Our computational gastronomical analysis led to the identification of spices as the molecular fulcrum of Indian recipes. We further investigated the therapeutic effects of culinary herbs and spices to highlight their broad-spectrum benevolence. We also created a data repository of flavor compounds (FlavorDB) and an integrated resource for empirical evidence of the health impacts of culinary herbs and spices (SpiceRx). We believe that these studies will provide an impetus for data-centric investigations of food, flavor, health and their related applications.

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