

# Cooking Studio: Cooking Simulation from Web Recipes

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**Abstract**—This paper proposes Cooking Studio, a cooking support system for cooking novices. First we describe a method to generate cooking scenario from Web recipe by morphological and semantic analysis, which is a basic document to represent cooking processes specifically in the system. We also provide cooking scheduling algorithm that maps the graph that represents cooking processes into a time chart to satisfy given restrictions. We also show a prototype system of Cooking Studio.

## I. INTRODUCTION

Recently, there are lots of Web recipes found over the Internet. They include ingredients required and set of instructions for preparing a food dish. For cooking novices, however recipes do not necessarily provide enough information to imagine cooking process or schedule procedures when cooking many dishes at the same time satisfying equipments constraints. In this paper, we propose Cooking Studio, a cooking simulation system as a supervisor for novices. The system works according to cooking scenarios generated from Web Recipes. Our final goal is to construct a support-system to simulate visual state of cooking process with this scenario for visualization in virtual space.

## II. GENERATING SCENARIOS FROM WEB RECIPES

We first define Cooking Schema as a format for fundamental elements, description of a dish, ingredients, and instructions. Then define Cooking Scenario in terms of XML as a basic document to express specifically cooking process in the system. To generate this scenario, our system first collects recipes from the Web, analyze them morphologically and semantically. We introduce "progress variable" that express materials that vary from ingredients each moment as cooking progresses. By this time, Cooking Scenario is completed with the supplementary information (1) progress variable, (2) information on cooking tools, equipments, time etc.

## III. COOKING SCHEDULING

Scheduling in cooking plays a crucial role. In case (1) we cook distinct cooking processes in parallel, (2) cook multiple dishes simultaneously, we have to take into consideration the following three restrictions in cooking, namely the properties of dishes, place and tools, and time. Cooking Studio provides a scheduling method to satisfy these restrictions. In our approach, we use a directed graph to represent cooking processes

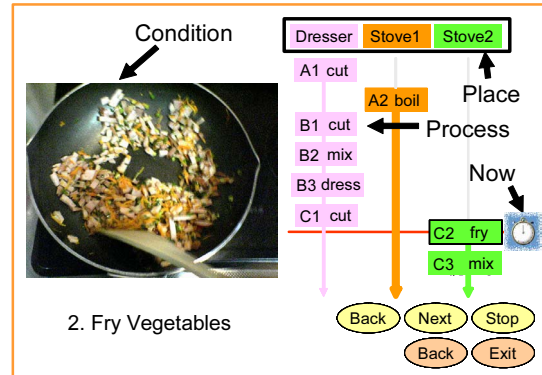


Fig. 1. Prototype System of Cooking Studio

and dependency on each other. We give an algorithm that maps the graph into a time chart to satisfy given restrictions and calculate cooking procedure with respect to granularity of simple process that is a basic component in Cooking Scenario.

## IV. COOKING SIMULATION

We build a prototype system that simulates stage of cooking visually according to Cooking Scenario. Our system displays a cooking procedure in a time chart. Cooking Studio has GUI easy to understand for users. The features of our system are summarized as follows, (1) generate a scenario, (2) schedule a cooking procedure, (3) simulate of cooking dishes that a user has selected. Fig.1 shows a prototype system of Cooking Studio. Left side of Fig.1 indicates a condition of the cooking process using texts, figures, and movies. And right side indicates a procedure of cooking converted into a time chart.

## V. CONCLUSION REMARKS

In this paper, we have proposed Cooking Studio that works with Cooking Scenario generated from Web recipes. Our system aims at solving the problem that a cooking novices faces in cooking, and scenario plays a role of a program that drives the system. With development of Web adaptation technology, the cooperation between human and machine is expected to increase more. As future works, we have (1) improvement of conversion precision from recipes to Cooking Scenario, (2) visualization in 3D virtual space, and (3) further development of Cooking Studio system for home appliances.