Smart Cook

There will be three main components to the Smart Cook App. First there will be a frontend, which is the most important part to the users, as this is what the users will see and use all the time. For this we want to stay as simple as possible while still offering a lot of different possibilities on how to interact with the Smart Cook.

The idea is, that a user can upload a picture of all his ingredients (all ingredients on one picture) to find one or multiple possible recipes that he can cook with these ingredients. As it is not always possible to find a recipe with just these ingredients, the recipe might feature a few more ingredients than the user has. These recipes will be in descending order, based on how many additional ingredients the user might need.

The second component will be the Machine Learning implementation. Here the picture that got uploaded by the user will get analyzed and every type of ingredient will get listed.

This list of ingredients then gets used in the third and last component, the backend, in which the list of ingredients will be called on an API to get recipes fitting to the given ingredients.

Before the list of ingredients gets queued to the API, the user will see the list of ingredients and must confirm them. In case that the AI identified an ingredient wrongly, the user can correct this mistake by deleting that ingredient. The user can also add an ingredient in case, either the AI did not identify that ingredient, or the user forgot to put that ingredient in the picture. The user may also upload an additional picture to add ingredients.

When confirming the ingredients, the user might also need to specify some ingredients, as it is impossible to sometimes know, what exactly is used. For example, if the ingredient gets recognized as “cheese”, the user will maybe want to specify that it is “parmesan”, to find a recipe that better fits his actual ingredients. Especially when it comes to bread, it might be hard to see, whether its full grain or not, but this might still be important for the recipe, so our idea for now is, that the user is able to specify what kind of bread it is, in the ingredient list.

After confirming the list of ingredients, the user has the opportunity to add additional information for the recipes he would like to get returned. The user will be able to add specific filters, for example for ingredients he is not allowed to eat, either due to religion, due to health problems or just due to individual taste. This, for the start, will be as basic as clicking an option for “vegan”, “vegetarian”, “no pork” or “no lactose”.

With these additional information and filter criteria, the backend team will also filter through all the given recipes and filter out all recipes that do not fit those criteria. After that, a list of different recipes will get returned to the user in descending order, based on the overlap of available and missing ingredients of the user.

Requirement Specification

Influencing factor	Example	Notes, comments
Task		
Type of task	Picture recognition for ingredients, recipe output	
Objective of testing	Customer benefit	
Detailed description of the task	Receive a picture as input, analyze ingredients via AI, query a recipe with these ingredients based on other information from user	User can give information of nutrition values he/she wants in recipe
Characteristics to be validated	Classification rate, reproducibility, false-alarm rate	
Objects for validation	Ingredients and non-ingredients	
Validation procedure	Proof of capability with documentation	
Evaluation of measurement and test results	Correct and false analyzes	
Temporal requirements	Under 2 minutes	Ingredient recognition should be done in less than a minute and the query as well
Required availability	When we need it	

Influencing factor	Example	Notes, comments
Test object		
Range of types	Pictures of ingredients and non-edibles	

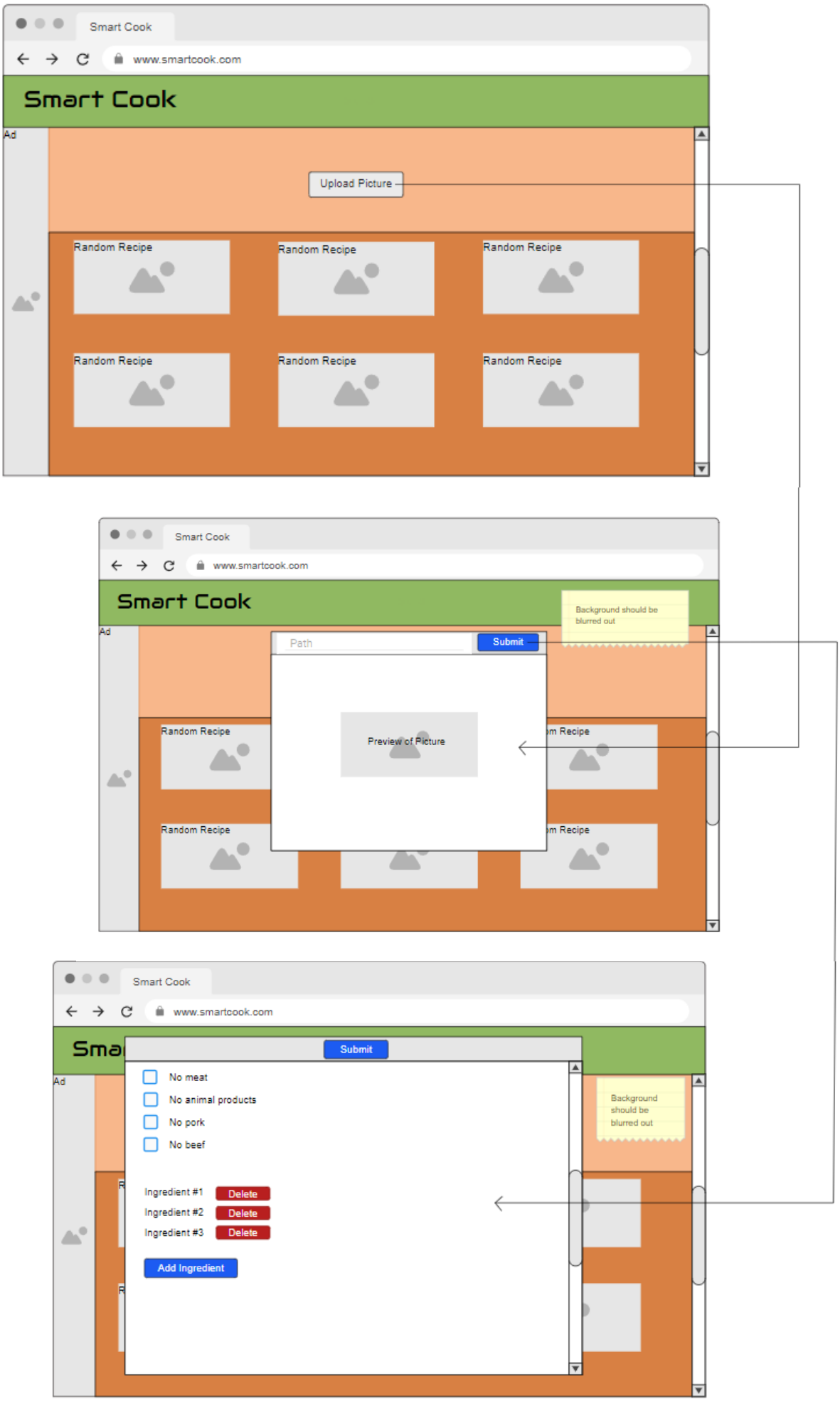
Influencing factor	Example	Notes, comments
Scene		
Positioning	Each ingredient should have a little gap next to another ingredient	This should make it easier and faster for the AI to differentiate between two different ingredients
Number of objects	One of a kind	Exception are things like: noodels, rice. There it should be the package?
Background	Distinguishable, clean background	There should not be a rice corn in the background, so that it doesn't get recognized as an ingredient
Size	Objects should not be too far away from the camera, so they are not too tiny.	
Movement	Ingredients should not move	
Quality	Ingredients should be in focus	
Extraneous light	Sun, lamps, any light source	Any sufficient light source, so that ingredients are visible, but not too bright, so that there are no big light reflections

Influencing factor	Example	Notes, comments
Process Integration		
Use of data from image processing system	Should not be saved, but directly analyzed	
Inputs and outputs	Input: ingredients Output: recipe	Based on a picture the ingredients get recognized
Operating modes	Automatic operation, manual operation	

Influencing factor	Example	Notes, comments
Human Machine Interface		
Operating concept	Graphical user interface, language,	
Visualization and signaling	Text and pictures	

Influencing factor	Example	Notes, comments
Miscellaneous		
Acceptance	Acceptance procedure	
Installation	Installation on phone	
Training	ML	Picture recognition of ingredients
Documentation	Diagrams, Documents, Mock-up for Back-End System, Mock-up for Front-End	Use-Case Diagram, Class-Diagram

Mock-Up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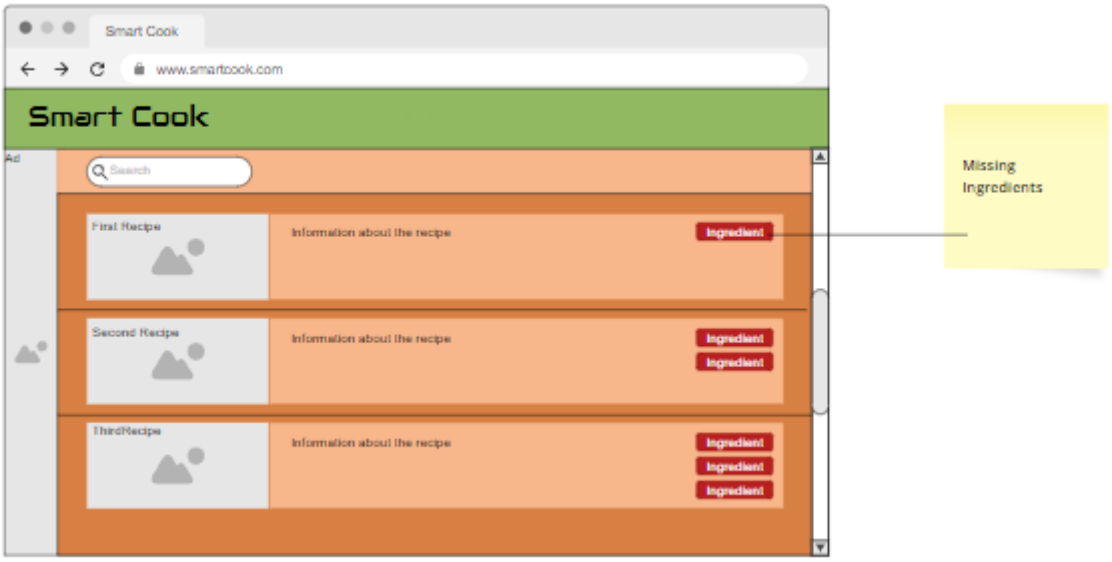
Ad
Upload Picture
Random Recipe
Random Recipe
Random Recipe
Random Recipe
Random Recipe
Random Recipe
Smart Cook
www.smartcook.com
Smart Cook
Background should be blurred out
Ad
Path
Submit
Preview of Picture
Random Recipe
Random Recipe
Random Recipe
Smart Cook
www.smartcook.com
Submit
Ad
No meat
No animal products
No pork
No beef
Background should be blurred out
Ingredient #1
Delete
Ingredient #2
Delete
Ingredient #3
Delete
Add Ingredient

Mock-Up 2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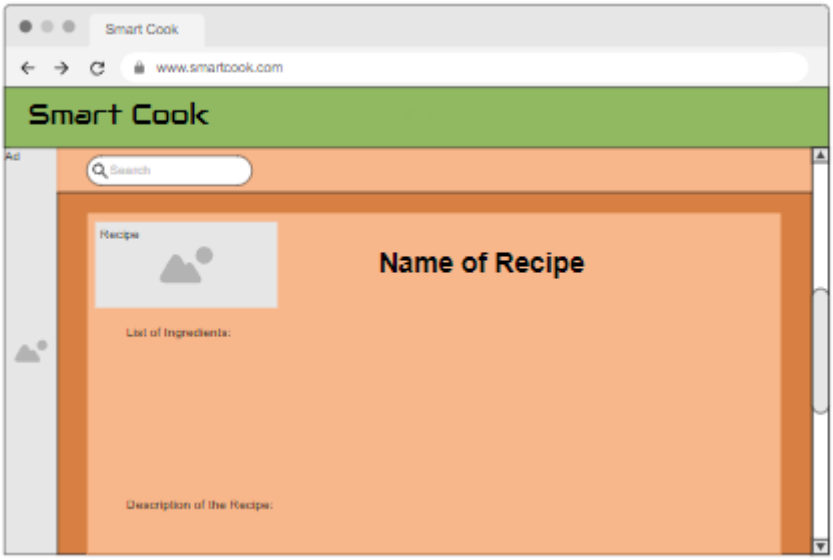
Search
First Recipe
Information about the recipe
Ingredient
Second Recipe
Information about the recipe
Ingredient
Ingredient
ThirdRecipe
Information about the recipe
Ingredient
Ingredient
Ingredient
Missing
Ingredients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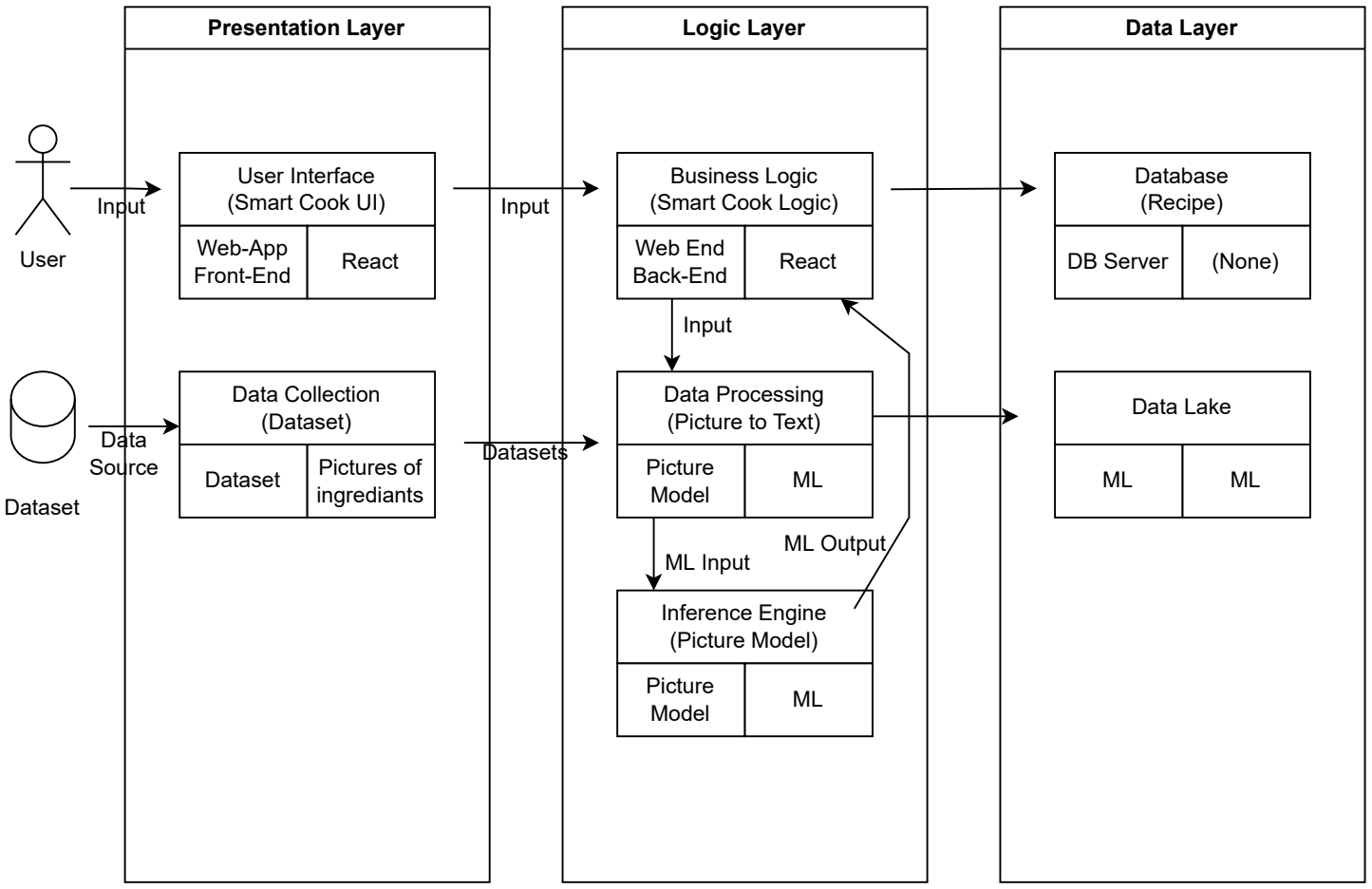
Search
Recipe
Name of Recipe
List of Ingredients:
Description of the Recipe:


Presentation Layer
Logic Layer
Data Layer
User
Input
User Interface
(Smart Cook UI)
Web-App
Front-End
React
Input
Business Logic
(Smart Cook Logic)
Web End
Back-End
React
Database
(Recipe)
DB Server
(None)
Input
Dataset
Data
Source
Data Collection
(Dataset)
Dataset
Pictures of
ingrediants
Datasets
Data Processing
(Picture to Text)
Picture
Model
ML
Data Lake
ML
ML
ML Input
ML Output
Inference Engine
(Picture Model)
Picture
Model
ML