Application of Computer Science Technology in Foods Teaching

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Abstract
With the continuous computer technology and the rapid development of science and technology, the computer is more and more widely used in education and teaching. In today's era, computer science and technology are contained in all stages of teaching, multimedia teaching, data processing system has entered the classroom, and computer science and technology has been widely used in education and teaching.

Keywords: *Data science, Practical training and teaching; Multi-media; Computer science*

1 INTRODUCTION

The English word for multimedia is Multimedia, which consists of two parts: media and multi. Generally understood as a combination of a variety of media. Multimedia technology is not a simple composite of various information media, it is a kind of Text, Graphics, Images, Animation, Sound and other different forms of information expression of organic synthesis, collectively known as multimedia, multimedia is eventually classified as a kind of technology, it is also because of the substantive development of computer technology and digital information processing technology, the application of multimedia technology is the characteristics of computer application in the 1990s, is also another computer revolution. Using new teaching means to improve the quality of running the school has become the core problem for the future development of the school [1]. This encourages teachers to constantly learn new science and technology, and improve the plan Application ability of computer technology [2].

2 APPLICATION OF MULTIMEDIA TECHNOLOGY IN TEACHING

Multidimensional technology- -Multidimensional technology means that multimedia technology has the ability to expand and comprehensively process the scope of information processing in space, and spatial expansion refers to the diversity of media. In multimedia processing, the input and output must not be the same, the input and output are exactly the same, and can only be called the repetition of information; When the input and output are different, if transformed and processed, the output can greatly enrich the performance of information and enhance the dynamic effect. Multimedia teaching is very vivid and intuitive, enhancing the diversity and freshness of the classroom, so as to stimulate students' interest in learning so that it is fully devoted to learning in the [3].

Multidimensional nature means that multimedia technology has the ability to spatially expand and comprehensively process the scope of information processing, and spatial expansion refers to the diversity of media. In the process of multimedia, the input and output must not be the same, the input and output are exactly the same, and can only be called the repetition of information; when the input and output are different, if transformed and processed, the output can greatly enrich the performance of information and enhance the dynamic effect. For example, by using the multimedia system to assist western food cooking teaching, students can not only learn the theoretical knowledge and skill training process in the textbook but also see the real action demonstration of teachers through multimedia technology to strengthen the effect of teaching. Multimedia features of courseware are the diversity of information, interaction in the process of learning makes all kinds of media forms free combination, fully arouse the thinking of the brain's mind, each information under certain conditions has its best way of expression, voice and video is not omnipotent, but has its limitations, so sound, video use by avoiding all means too much, excessive, available when unnecessary, in line with the principle of prefer, prevent unnecessary sound effect

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interference influence teaching, make the information concise, concise. At the same time, if sound and video are used in the creation of teaching situations, there can be related sound and video in the process to avoid feeling anticlimactic. In order to be effective in classroom teaching, the use of audio and video must deal with the use of teaching-related parts. Students are deeply impressed by this communication controlled by multi-dimensional senses and obtain a good knowledge memory effect [4].

In teaching, through the food experiment design and the application of data science, the experiment design should first identify the problems, select the experimental factors and levels as well as the variables concerned, and reasonably arrange the experiment with clear ideas, which is of great significance for the normal operation of the follow-up experiment. It can analyze the feasibility of the existing experimental scheme and evaluate it; Be able to use the learned design methods to design the food test scheme; Be able to accurately judge, select and apply the learned mathematical-statistical methods, correctly process and analyze a large number of test data, and obtain reasonable results and conclusions; The ability to use common analysis software for data processing has certain guiding significance for the industrialized production of food.The research objects of food science are diverse, the raw materials are heterogeneous, and the process is complex. It is necessary to scientifically design experiments and analyze data in order to detect the internal regularity of things. R language belongs to a branch of s language, which was born around 1980. R has cloned the advantages of s language and formed a complete software system for data processing, calculation and drawing. R is not so much a statistical software as a mathematical computing environment, because r does not only provide several statistical programs, and users only need to specify databases and parameters to perform a statistical analysis.

3 APPLICATION OF DATA PROCESSING SYSTEM IN TEACHING

3.1 Characteristics of Multimedia Technology in Western Food Teaching

3.1.1 Practical training and display and teaching

Cooking professional teachers in the demonstration class, often face students, students watch not convenient, cannot see clearly, and cannot timely grasp the key points of teaching difficulties [3] show training teaching is mainly after using students after learning Powerpoint software, the training the production process of the products, raw material pictures, video, and other training information summary, in the training room with computer and projector broadcast to the students.

3.1.2 Practical training, demonstration and teaching

Demonstration training teaching refers to the training teacher demonstrating the training operation process in front of the camera in the training operation demonstration area. It uses multimedia technology to project to the screen of each area of the training classroom. The students learn and practice the training operation synchronously by watching, and the teacher gives guidance again. Such western food dishes production, according to the teacher's demonstration, students from the product quality standards for training.

3.1.3 Practical training and interactive teaching

Interactive teaching refers to the operation process of teaching the teacher about the practical training and teaching content to the students through the multimedia network platform and using multiple monitors to switch over the teacher demonstration at the same time and to display it from different directions and angles. In the key and difficult links, the large close-up technology can be used, so that the students in all positions can clearly see the practical training teachers' knife work, cooking, seasoning, plate loading, and other technologies. Solve teaching difficulties and optimize classroom teaching.

3.2 Formula and Method

3.2.1 Mushroom beef meatballs basic recipe

After consulting a large number of relevant literature and watching videos, the approximate formula was determined and then adjusted through multiple pre-experiments to obtain the following basic formula.

Added according to the weight percentage of minced beef and mushroom, minced beef and mushroom total 100g, black pepper 1%, water 10%, salt 2%, egg wash 6%.

3.2.2Preparation technology of beef pellets

Shiitake mushrooms → Clean and chop → material selection → cleaning → Stir with auxiliary material → Made into pellets → deep-fried (temperature: 135°C) → finished product

3.2.3Sensory evaluation scale.

Food sensory evaluation is an objective evaluation of food quality based on the human body's own sensory organs, specifically the eyes, ears, nose, mouth and hands. That is to comprehensively evaluate and evaluate the color, aroma, taste and appearance of food by looking with eyes, smelling with nose, listening with ears, tasting with mouth and touching with hands. This experiment is an analytical sensory evaluation

experiment. The environment for the sensory evaluation experiment shall meet the following requirements: keep quiet during the sensory evaluation experiment to avoid noise interference; Avoid other personnel entering and leaving the sensory analysis laboratory at will to avoid interference to the evaluators; The sensory analysis laboratory shall be well ventilated to avoid the interference of the residual odor to the evaluators; Before sensory evaluation, a standard is usually made for sensory evaluation, and training instructions are given to the personnel of sensory evaluation, so that the personnel can make the sensory scoring objective and authentic. Food sensory inspection technology is a subject that studies the acceptability of food. In terms of how to improve the acceptability of food, sensory evaluation technology has incomparable advantages over other inspection methods such as physics and chemistry.

Table 1. Sensory evaluation scale.

Sensor evaluation (Score)	1 ~ 6	7 ~ 14	15 ~ 20
Color	Color is dark, color is too heavy	color light yellow, too light	Golden yellow color
Flavor	The beef with mushroom flavor is light,	The beef with mushroom flavor is not coordinated	The beef with mushroom flavor in coordination
Taste	Too hard or too soft, crumbly	A little soft or hard to chew	Smooth, delicate, soft and firm
Tissue Status	he section is rough, the pores are large, and the distribution is uneven	The section is more uniform, slightly larger pores	The section is densely uniform, and the pores are small and uniform
Elasticity	No elastic force, the finger pressure surface will be immediately cracked, can not recover	Elastic force is medium, the finger press does not crack, can recover quickly	Good elasticity, the finger press does not crack, can quickly recover

3.4 Using R for data analysis

We used R 4.1.1 to process and analyze the collected data and used ggplot2 for data and model visualization.

3.4.1 Data loading and preprocessing

After loading the data using R build-in function read.delim, we calculated the retention rate using raw sample quality and sample quality after the experiment, as shown below. Here, we use data collected from corn starch for demonstration. Data for other starches were analysed following the same pipeline.

```
data <- as.data.frame(read.delim("data.txt"))
head(data)
```

```
##   Addition.of.starch Raw.sample.quality Sample.quality.after.the.experiment
## 1                  5                130                                 110
## 2                 10                135                                 116
## 3                 15                136                                 125
## 4                 20                139                                 127
## 5                 25                141                                 129
## 6                 30                145                                 131
```


```
data <- as.data.frame(read.delim("data.txt"))
head(data)
```

```
##   Addition.of.starch Raw.sample.quality Sample.quality.after.the.experiment
## 1                  5                130                                 110
## 2                 10                135                                 116
## 3                 15                136                                 125
## 4                 20                139                                 127
## 5                 25                141                                 129
## 6                 30                145                                 131
```


Figure 1: Data loading and preprocessing.

3.4.2 Polynomial model fitting

As it was observed that the relationship between the percentage of starch addition and the retention rate was polynomial rather than linear, we used R build-in function lm to fit the polynomial model and used summary to inspect the model. From the results, we see that we achieved R square of 0.8719, and the fitted equation is $y = 0.78842 + 0.01149x - 0.00026x^2$.

```
reg <- lm(Retention.rate~Addition.of.starch+I(Addition.of.starch^2),data=data)
coef(reg)

##             (Intercept)      Addition.of.starch I(Addition.of.starch^2)
##           0.7884161022            0.0114918086           -0.0002552065
summary(reg)

##
## Call:
## lm(formula = Retention.rate ~ Addition.of.starch + I(Addition.of.starch^2),

##     data = data)
##
## Residuals:
##          1          2          3          4          5          6
##  6.659e-03 -1.855e-02  1.575e-02 -2.501e-03 -1.314e-03 -3.623e-05
##
## Coefficients:
##                              Estimate Std. Error t value Pr(>|t|)
## (Intercept)                 7.884e-01  2.622e-02   30.07 8.08e-05 ***
## Addition.of.starch          1.149e-02  3.431e-03    3.35   0.0441 *
## I(Addition.of.starch^2) -2.552e-04  9.595e-05   -2.66   0.0764 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.01466 on 3 degrees of freedom
## Multiple R-squared:  0.8719, Adjusted R-squared:  0.7865
## F-statistic: 10.21 on 2 and 3 DF,  p-value: 0.04586
print(paste0("Equation is y=", round(as.numeric(coef(reg)[1]),5),
             "+", round(as.numeric(coef(reg)[2]),5), "x",
             round(as.numeric(coef(reg)[3]),5), "x^2"))

## [1] "Equation is y=0.78842+0.01149x-0.00026x^2"
```

Figure 2: Polynomial model fitting.

3.4.3 Model visualization

We used ggplot2 to visualize the model fitting as shown below.

```
library(ggplot2)
p <- ggplot(data = data,aes(x = Addition.of.starch, y = Retention.rate))+
  geom_point()+geom_smooth(method='lm',formula=y~x+I(x^2))+
  ggtitle("Relationship of retention rate and addition of starch")+
  theme(legend.title=element_blank())
p
```

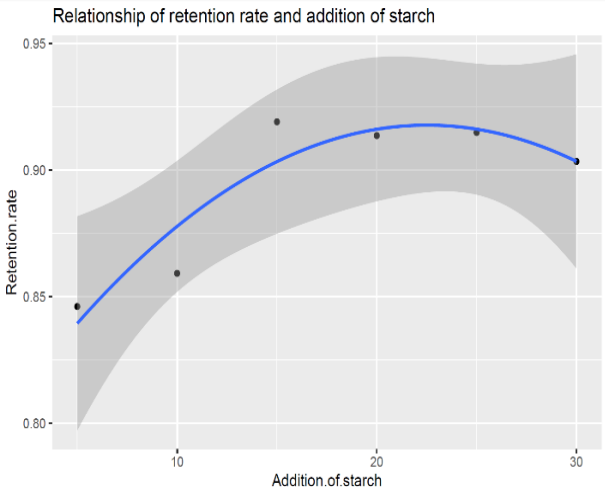

Figure 3: Model visualization and water retention rate of corn starch

3.4.4 Water retention of corn starch

The amount of denatured starch is added at 15%, and the water retention ability of hamburger steak is optimal. When the added amount is 5%, the water retention rate of mushroom beef meatballs is the lowest. When the added amount of corn starch gradually increases, the water retention rate of mushroom beef meatballs is also increasing. After reaching 15%, the added amount of corn starch is more than 15%, and the water retention rate of mushroom beef meatballs begins to decrease. Corn starch in mushroom beef meatballs is 15%, and water retention is the best. The water retention rate of corn starch is shown in Figure 3.

3.4.5Water retention of potato starch

Potato starch has a high viscosity and large particle size, resulting in low gelatinization temperature, strong water absorption, and high transparency of paste, which can prevent a color change in meat products. Potato starch gel has a strong binding ability, anti-aging, swelling, and water absorption ability, which has a great effect on improving the gel strength of meatball products; The starch gel with high amylose content has a weak binding ability and large brittleness. The additional amount of potato starch in mushroom beef meatballs is 15%, and the water holding capacity is at the maximum. When the addition amount of potato starch in mushroom beef meatballs is more than 15%, the quality begins to decline, and the water holding capacity also declines. The water retention rate of potato starch is in Figure 4.

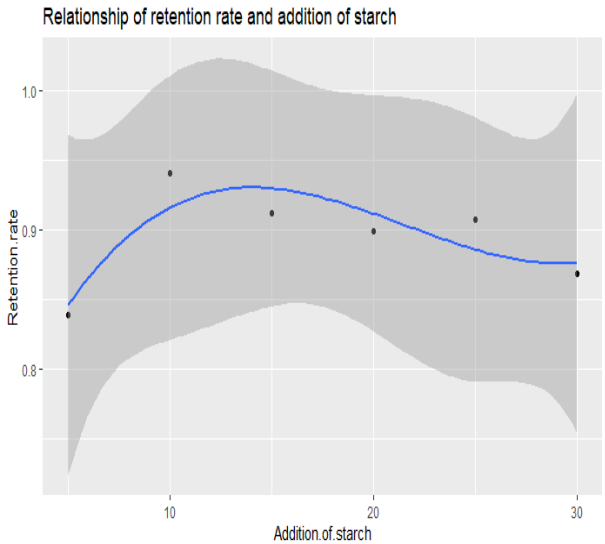

Figure 4: The water retention rate of potato starch

3.4.6 Water retention of Wheat starch

Wheat starch paste has the characteristics of low thermal viscosity and low gelatinization temperature. The end gelatinization temperature of wheat starch is about 64 ℃, while the end gelatinization temperature of corn starch is about 72 ℃. In addition, the thermal stability of the viscosity of wheat starch powder after gelatinization is good. After long-time heating and stirring, the viscosity decreases very little, and the strength of forming gel after cooling is very high. With the increase in the amount of wheat starch, the water

holding capacity of mushroom beef meatballs gradually increased. When the amount of wheat starch was 10%, the water holding capacity of beef meatballs reached the maximum, indicating that the addition of wheat starch significantly improved the water holding capacity of beef meatballs. However, with the continuous increase of the amount of wheat starch, the water holding capacity of beef meatballs did not increase significantly, which may be due to the fact that the starch could not fully absorb water and swell when the amount of wheat starch was too much water retention rate of wheat starch is shown in Figure 5.

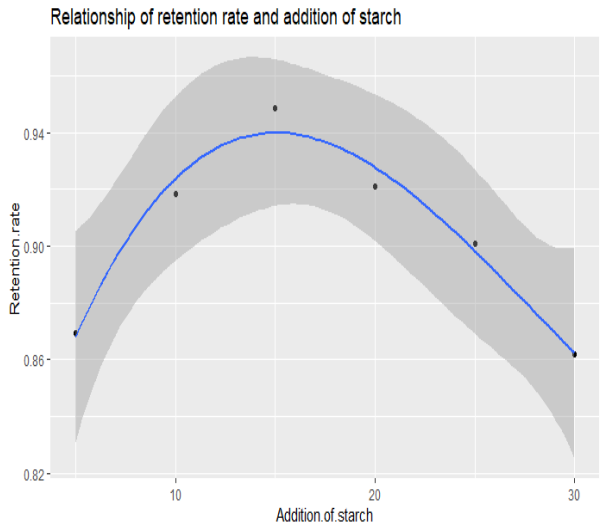

Figure 5: The water retention rate of wheat starch

4 CONCLUSION

Teachers should master and apply modern educational technology, which is an important symbol of educational modernization and an important condition for realizing educational modernization. The international competition in the 21st century is the competition of economy, the competition of scientific and technological strength, and in the final analysis, the competition of talents. With the rapid development and wide application of information technology, the development of modern educational technology is also very rapid, and has caused profound changes in education, which has brought a far-reaching impact on educational concepts, teaching methods and teaching organization forms."Interest is the best teacher". Creating lively learning situations in teaching is always popular in teaching practice. However, in the actual teaching, teachers often neglect the cultivation of interest while imparting knowledge.Use multimedia technology to create lively learning situations through vivid, intuitive and enlightening demonstrations. Students will gradually arouse their interest in learning, find problems from the situations, and then carry out targeted discussions and put forward ideas to solve problems through perception, experience and internalization into their deep-seated needs. After such a virtuous cycle, students' ability to actively participate in inquiry activities will be greatly strengthened.In teaching, food experiment design and data processing put forward scientific and reasonable plans for specific problems to be solved through experiments in food science research, guide and ensure the correct implementation of the test links, stand rive to obtain as much data information as possible with the most economic test input, and process the data with scientific statistical methods after the test results, so as to draw reliable conclusions, So as to further guide food production and scientific research, with the development of society and the progress of science and technology, the application of computer technology in practical training and teaching is gradually being deepened. In order to meet the needs of talent training, teaching methods and means are also constantly improving, multimedia technology is widely used in the process of practical training and teaching. The use of computer-aided teaching, multimedia technology, and teaching software plays a more and more important role in teaching and achieves good teaching results. Only teachers who master modern teaching theories and modern teaching means can be cultivated Generations of talents.

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