Automatic Color Matching with a Computer
66116T Kei Takahashi

- **Title:** Automatic Color Matching with a Computer
- **Audience:** People who have chance to create websites or documents on
  the computer
- **Purpose:** To inform them that the color matching problem is important,
  and our new method with machine learning offers a good solution
- **Thesis statement:** Machine learning, a method to analyze information
  by a computer, is useful in the field of color matching.

1 Introduction

1.1 Capture audience attention

Please look at these web designs: I’m sure each of them gives you different
impressions, but I hope nobody dislike it. We can say these color pairs are
universally accepted.

How about these? Some of you might like them, but most of you will
find they make your eyes tired. At least these color pairs are not suitable
for company’s websites.

These days the importance of websites are increasing, and more and more
people need to create new sites for commercial purposes. Think of you’re in
this situation. You are asked to create an attractive website until tomorrow.
As you have seen, color choice is quite important to leave good impression
on visitors. But the time is quite limited and you’re not an experienced
designer. What can you do? You might want to ask it to a professional web
designer, but it costs so much...

1.2 Establish Credibility:

Hello, my name is Kei Takahashi. My major is Computer Science and I’ve
got bachelors’ from Tokyo university. Here in TKK, I belong to CIS lab,
researching machine learning.

1.3 Overview of this presentation:

Today, I’m going to talk about computerized automatic color matching.
First I will explain why color matching is important. Next, I will show an
approach to color matching that uses a method known as machine learning.
And then we present a practical application called : the automatic color
adviser, which can be used for PowerPoint and Word.
2 BODY

2.1 Color matching : its importance

2.1.1 What is color matching?

(Slide 4) First, here is a question: “what is color matching?” It’s an area to define if two or more colors match or not. Although the result depends on persons and cultures, there sure exist universally accepted color combinations.

2.1.2 Commercial importance

Even if the contents are the same, their color can make it meaningful or boring. Coloring makes all the difference. Although the preferences varies person to person, we need to avoid controversial colors. Also you can’t use the same color all the time. Uniqueness is always required to leave some impressions on customers. Otherwise we can always use black and white documents, of course it is boring. A large company pays hundreds of thousands of euros to choose their corporate color.

2.1.3 Growths of demands

20 years ago, not so many people needed to care about the color design, since they had no chance to design anything. Only press editors and product designers did. However, because of the spreading of the internet, nowadays everyone creates their websites and you can use any colors for that. But here is a problem.... how can you choose those colors? You are always faced on millions of choices for each color. It is so time consuming to choose perfect colors.

Also we are supposed to appeal your work or products on the web. Of course you want to make the page attractive. A good web design should be unique, so we need to create new color design all the time. If you can hire a skillful designer, the problem is solved.

2.2 Our approach : the judge machine

2.2.1 What is the judge machine?

You might be bored at your task to struggle with many colors. You may think if someone gives you some advices, the task will be much more easier. We think a computer has this ability... now we explain.

We propose the judge machine, which tells if two colors match or not. It looks simple, but it has a great potential to generate infinite good designs.
2.2.2 Machine Learning

Our purpose is use a method called “Machine Learning”. With this method, you can train a computer with existing data. Data contain both good and bad ones. The computer accumulates knowledge and now it can judge unknown data. Now, you can use this computer for unknown data.

The point is that you don’t need much amount of data. It is different from just making a “table”. The learning with only 100 examples can perform well for millions of data.

We have short summary of the process here. First, a teacher prepares training data. Second, train the computer with those data, and finally use it to unknown data. The program acts just as the teacher.

2.2.3 Prototype experiment

Then we proceed to our prototype experiment for color matching. First we generated 100 color pairs, and separated it into two groups by hand... those match and not. In this experiment, the denominator is just of me. Then we taught a computer with those data, and got a judge machine.

Now it’s time to use it. We also prepared another 100 color pairs, and we separated them into two groups in two ways.... one is by a human, the other is by the judge machine. The two result agreed 80%, so we can say learning was successful and this machine can be used for a good adviser for colors. It means, if you put data valued by a professional designer, the machine works just like them. So each of us can have a professional designer.

2.3 Practical Applications: automatic color adviser

Now we reached the final part and the most important part. Based on the judge machine, we propose the automatic color adviser, which can generate infinite numbers of good color pairs.

First generate color pairs randomly, and put into the machine. Then only good pairs are survive. All of those pairs are good color pairs, so all you need to do is just select one from those.

There are many practical applications for it. You can use it for websites design. We propose to implement it on PowerPoint or Word, then it offers infinite candidates of color designs. As long as I know, there are no similar function on these software. When you color the background black, the texts are still black and you need to change the color of the text by yourself. With this machine, the text color is chosen automatically based on the judge machine.
3 Conclusions

Let’s look back what we’ve seen today. First, color matching is important, since it is directly connected to the value of products or documents. Second, our judge machine learns the color taste of professional designers. Third, we proposed automatic color adviser, which offers infinite color pairs in no time.

Now we have this machine. Again, you’re facing a situation that you need to design 10 websites overnight. Now it’s quite easy, just use this program, and select 10 candidates from them. Whichever you choose, it’s perfect, since now you have a professional designer besides you. The program learned the taste of him/her sense, and even have an ability to generate new color pairs. The program will be ready soon, so we hope you try it soon, and create a great website with it.