**Artistic style transformation of images**

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**Abstract**

The topic of this research is to implement the picture recognize and auto colouring which is based on the recognizing algorithm and machine learning. Algorithms about machine learning and image recognition are the hot trends of artificial intelligence in the computer science, and their popularity does not seen to be losing any momentum. For instance, PaintsChainer, the website provides auto colouring service, give the state of shock to the painting field in 2016, and it has undoubtedly become a significant application in machine. At almost same moment, The cloud version API was open by Google in the February. It is the service that help developers to integrate the function of image recognition. Base on these news in the last year, our group intend to research and apply the image recognize and auto colouring.

**Project Background**

Artificial intelligence had become really popular in this time, according to artificial intelligence, the machine can be recognized as a really person in some area. Machine can resemble as a really people and to do something like people.

Nowadays, object recognize is still a challenge in artificial intelligence, how to improve those and to make the machine to recognize the object even we just have a part of that object is useful to improve human’s life quality. According to it, it can reduce the cartoonist’s job with they just need to draw the important part for each picture and the machine will finished it with the cartoonist’s style. Moreover, paint for a picture need to spend a long time and need to be careful for it, if there is a application that can paint by itself by training it with a lot of picture, it will reduce cartoonist’s job too, the assistant of cartoonist can be easy to do and the machine will never make a mistake. If an application that can recognize our draft and complete it and paint for it, it will be amazing, however, while the application can modify the style to make it match a master’s style will be interesting.

According to our group idea, our application will have three parts. The first part, it need to recognized things by itself and to complete, in this pare, artificial intelligence need to be used to recognize and complete an object, as also, the style of drawing a picture need to be learned from the people’s draft to make sure that the picture complete by our application can match the style and make it looks like the user draw it. The second part it to paint for the picture that complete by our application, it will base on deep learning, it is also belongs to artificial intelligence. The last part of our application will change the style of that picture to make it match a master’s style to make the user to be a master.

**Project Plan**

For the whole project, we split it into 6 section and have a clearly aim for each section. The six sections include research, analysis requirement, system design, coding, testing and publish. Moreover, we will use Gantt chart to manage the process of our project.

Research:

Both of our group members know artificial intelligence and deep learning, but we do not focus on dealing with images，so the first step for our project is to do the research about how AI and deep learning works in images and what the situation in this area currently. In this section, our aim is to increase the background knowledge about our project. For this section, we need to spend the first month to do it and after that, we still need to do the research but also focus on other section not just reading academic paper.

Analysis Requirement

After the first section of researching, we will analysis the requirement of our project. We already know what we need to do, but is just a instruction of our project, in this section, we will discuss with our group members about more detail information about our project, each group member will show their idea about our project and how to make it stronger and powerful. In this section, we need to spend 1 week on it, if is necessary, it can be expend. In a real environment, the requirement might changes very frequency, so it could modify while we start other sections.

System design

We have the detail information after the section of analysis requirement, so we can start to design our project. In this section, we will make the decision about the environment of our project and the code structure of our system. We will split our system into several small subsystems and to make it easier to maintenance. It is really important for a system that is easy to maintenance. In this section, we will spend 2-3 weeks to do this.

Code

In the section of system design, we have the structure of our project. According to the code structure, we can start to code. In this part, we need focus how to implement the function that required in our system, we already finished reading a significant number of academic papers and have enough background knowledge to make it. Of course we will meet some trouble in this part and we will try to fix it with help each other and do the researching. It might spend at least 7 - 8 weeks.

Testing

In the part of system design, we split our system into several subsystems to make our system is easy to maintenance, that means while we finished a subsystem, we can start to test it to make sure it will work well. It will start after the beginning of the section of Code, and will end after the section of Code too. It will spend 7 – 8 weeks too.

Publish

In this part, we already finished our work and the project can run successful, and then we will publish it to make user can use it. It is not a necessary section and it’s depend on when we will finish the project.

**Risk Assessment**

1. Software project risk

Software project developers are concerned about such a problem when they develop the project: what kind of factors will lead to failure of software projects？How the project is affected when the project-related factors are changed? All of these are risk issues that developers need to consider in software project development. The risk of a software project is that the uncertainties that may occur during the software development process cause loss or influence. Such as funding shortages, staff changes, delays in project progress and other issues. If the project risk occurs during the project development period, it may affect project progress, increase project costs, and even cause software projects to fail. Therefore, it is necessary to analyze the project risks and respond to risks to take appropriate measures to minimize the losses caused by the risks.

Software project risk mainly includes the following four categories:

1. Because the development team and customer communication is not clear lead to customer demand is not clear, such a risk may occur in the entire software development project life cycle. Mainly including requirements change risk, process risk and installation and maintenance risks.

2. Because the quality of management is not enough, lack of experience, poor communication and unreasonable distribution of tasks caused by the risk. Mainly including the progress of risk, budget risk, management risk, information security risks.

3. Because to lack of technical strength, lack of development environment tools caused by the risk. Mainly including technical risk, quality risk, software design tool risk, software development tool risk, employee skill risk.

4. Because of the company or the project team internal and external changes in the environment caused by the risk. Mainly including human resources risk, policy risk, market risk, marketing risk.

1. The risk in the project

For the software project in this article, the development team also needs to face the risks mentioned above.

* 1. Requirements change risk

The requirement change risk is that the demand has become the project benchmark, but the demand continues to change; the lack of definition of the requirements, so that further definition will expand the scope of the project; add additional requirements, product definition ambiguous parts need more time than expected; Effective demand change management process.

The way to prevent this risk is the need for team members with a high degree of cooperation and close collaboration, careful allocation of team members' work when conducting requirements analysis. And to effectively curb demand changes, the software needs change is the biggest enemy for the software project development and implementation in the software project at all stages may occur. The later the change in demand, the greater the harm to the project. So the demand for software changes throughout the control and implementation of the various stages of the software. In the demand analysis phase of the user demand changes mainly for the user needs of the repeated, easy to make the needs of the analysis work in situ, cannot be completed according to plan needs analysis.

* 1. Technical risk

In the process of software project development and construction, strategic management technology is a very important factor. The project team must be in line with the actual requirements of the project, choose the right, mature technology, do not ignore the actual situation of the project and use some advanced but not the project must and not familiar with the technology. If the project requires the technical project members do not have enough or not enough, you need to focus on the risk factors. Significant technical risks include: the existence of software architecture system problems, resulting in the completion of the software product failed to achieve the project target; project implementation process with a new technology, due to the existence of defects in the technology or technology in the grasp is not deep enough, resulting in the development of The product performance and poor quality.

The way to prevent this risk is to use the technology necessary for the project, in the technical application before the relevant personnel to carry out good technical training. First of all, do a good job in the technical review of the various stages, through the collective wisdom to ensure that the feasibility of the technology used in the project and the correctness of the technical program. Second, the use of new technologies to be careful, to step by step, as far as possible the use of mature technical solutions to complete the software development work. Third, in the technical innovation and technical risk between the balance, and do a good job of innovative technology research and testing. The need to evaluate the various technologies used in the software project process, software project management in the development of software development plans must consider these factors, and make a reasonable trade-off decision.

* 1. Tool risk

Software project development and implementation process, the necessary management tools, development tools, test tools, etc. can be Timely in place, the tool version is consistent with the project requirements, etc., is the project team need to consider the risk factors. Some software projects are multi-user concurrent application system, the system requirements for high performance, the project team will need to pay attention to the project's performance risk.

The way to prevent this risk is usually to implement the tools at the start-up phase of the tools or possible alternative tools, before the need for the use of these tools (usually need a month or so in advance) to track and implement the tools in place. Before the project development and design and build the system infrastructure and performance testing to ensure that the framework to meet the performance indicators and then follow-up work. And the team's technology is biased towards that tool.

**Project Plan Timeline**

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| **Team Formation** | **Week 1 – Week 3** |
| **Framing Code of Conduct** | **Week 4** |
| **Background Study and Project Proposal** | **Week 5 – Week 6** |
| **Creation of Software Requirements Specification** | **Week 7 – Week 10** |
| **Analysis and design of system blue print** | **Week 11 – Week 13** |
| **Design of Test Cases** | **Week 14 – Week 15** |
| **Project Progress Analysis and Submission** | **Week 16** |
| **Integration Testing and Project Documentation** | **Week 17 – Week 20** |
| **User Acceptance Testing for the Project** | **Week 21 – Week 22** |
| **Project Thesis Preparation and Demonstration** | **Week 22 – Week 26** |

**Teamwork: Roles and Responsibilities**

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| **Team Member** | **Role** |
| Rixin Nie | Manager and Developer |
| Tam Van Phan | Developer |
| Praveen Vinny | Project Documentation and Meeting Minutes keeper. |
| Jiajun Li | Documentation |
| Kwan Ho Alan Cheng | Tester |
| Zhuo Wang | Tester |

1. Rixin will be the manager. Rixin will also act as the first escalation point for any issues within the project.
2. Rixin will also do the development.
3. Tam will also do coding with Rixin. While Rixin is concentrating on the Web and UI design, Tam will be concentrating on the backend coding.
4. Praveen will be responsible for keeping the minutes for each of the meetings.
5. Praveen will also do the entire documentation for the project along with Jiajun Li.
6. Even though Rixin and Tam will do unit testing on the modules they are developing, Alan and Zhuo Wang will write test cases and thoroughly examine each module developed in every phase to validate and verify the requirements.
7. The members would be in need to take additional responsibilities in times of urgent need.
8. During the final phases of the project, if there arises a need, Praveen will also do coding with Rixin and Tam.
9. Jiajun will help Alan and Zhuo Wang in test case execution during the integration of various sub modules in the project.

**Conclusion**

In fine art, especially painting, humans have mastered the skill to create unique visual experiences through composing a complex interplay between the content and style of an image. Thus far the algorithmic basis of this process is unknown and there exists no artificial system with similar capabilities. However, in other key areas of visual perception such as object and face recognition near-human performance was recently demonstrated by a class of biologically inspired vision models called Deep Neural Networks. Here we introduce an artificial system based on a Deep Neural Network that creates artistic images of high perceptual quality. The system uses neural representations to separate and recombine content and style of arbitrary images, providing a neural algorithm for the creation of artistic images. Moreover, in light of the striking similarities between performance-optimised artificial neural networks and biological vision, our work offers a path forward to an algorithmic understanding of how humans create and perceive artistic imagery.

**References**

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