**Needs Finding and Design Alternatives Report**

**-By Group 2**

1. **Introduction**

To make a meaningful and fun Computer Vision project, Group 2 go through needs finding ,design alternatives, simple prototyping and evaluation. First we go through individual brainstorm and group brainstorm to decide the constraints of our project design. Then go through individual brainstorm and group brain storm to find out several project ideas and discuss several “candidate” ideas. Then discuss the priority of those candidate ideas from the constraints and some pre-evaluations and using the knowledge to make a group decision.

1. **Constraints Design:**

After our brainstorming and discussion with Tara’s demand, our final constraints are:

a． Data collectable(like from website)

b． Data Accessible

c． Budget Constrain(don’t be expensive)

Computing Power Level limitation

Human Power Limitation.

d. Project meaningful(like create value)

e. Social responsibilities constraints: environmental friendly and morally sound

f. Regulation constraints

g. Can be interviewed by your user.

1. **Project Ideas Brainstorming:**

All ideas see:<https://docs.google.com/document/d/1foqqMSyL9hPaa_2sJ2ilsjByNQtcKSoY0DUxDOGxaZM/edit?ts=5f5e7741> or Appendix

1. **Candidate Ideas:**

From our discussion of all ideas, we find out a lot of similar ideas which can make a combination and become a new good idea. Like blind dating by human face pairing, pet face pairing, document recognition and using pictures to predict financial markets. After voting the interests of our teammate, we finally decide to make research on 3 ideas below. Here are our Candidate ideas needs finding and design:

**Pet face project:**

The original idea is to recognize pets’ emotions by applying the Computer Vision technique to analyze pets’ faces. The information about the pet’s emotion could be used for some recommendation applications. For example, pets online retailing platform could provide this service, and pets’ owners could know whether their pets like the products or not. Therefore, the application could increase the user experience.

Since it is hard to find datasets containing the label of pet’s facial emotion labels, it is hard for us to train a model that can recognize pets’ emotions. We changed the approach of the project. We propose to use deep learning convolutional neural networks to detect, verify, and identify individual pet faces in digital images, and use this application to recognize a particular pet in some target datasets. With the application, we could build up a third-party platform for pets identification and recognition and help people find their lost pets after uploading their pets’ pictures.

Microchipping for pets identification is costly, and if we can establish a pet’s face recognition system, it would vastly reduce the cost.

**Financial Market Prediction Application(Or Pattern recognition):**

This project tries to use the CV technology to recognize the pattern in stock price.(K-line chart) Find out the pattern which in statistics can predict a stock price increase. Then use CV technology to find out the similar pattern in daily stock trade and if find out such kind of pattern, make notice to the application users.

**Blind Date(Finding your Mr. Right) Project:**

This is a project combined with several ideas on human face recognition and pairing. Using the CV technology to find out the similarities between human faces or find out the person who has the most similar face to your dream Mr.Right.

From our research (asking our friends) we find out that although the young people hate “blind date” arranged by their parents. They are very willing to make friends and find out their Mr. Right. And most young people tell the truth that the most important thing when they choose a person to become their boy or girl friend is their face.(Hehe, Human beings) And they are very willing to find out the perfect face they want to see.

So we decide to design this projects like let the user score their preference on some example face. Then use similarity between the other users’ face and example face with the preference as weight to find out the recommendation face.

But considered the constraints, we find out the problem of this project.

1. Budget limitation and Regulation: To complete this project we need to find out several example face, which means we have to pay for the use rights of those faces. And it’s also very hard to decide the example face.
2. Meaning with moral risk: The logic behind this project is dark. Human use faces as their first standard to find boy or girl friends. Although this is the fact for a lot of people, this sound not so moral in Chinese culture. As we needed to gain the feedback from our friends and most of our friends come from China, there could be a risk to explain the logic of our project.

**5. Conclusion and next step:**

We evaluate our 3 projects from these dimensions and PO evaluate them in this from our majority opinion:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Project** | **Data Accessible** | **Tech Accessible** | **Meaningful Degree** | **Risk** |
| Pet Face | Good | Good | Good | Low |
| Financial Application | Good | Not Clear | Not clear | Low |
| Blind date | Not Good | Good | Good | High |

So we decide to move forward the pet face project. Next step we decide to design the baseline design using the next iteration for this project.

Next Iteration: <https://docs.google.com/document/d/1aXEHUcI2yUAsIrfLDhACs5Gc-dgte2q2r5RcTIAM9kA/edit>

Proposal:<https://docs.google.com/document/d/1jy-gt3kVcfXk6awGJRgdf1Gyri2P-FMB6uqq2j1tx4c/edit>

However we choose other 2 projects as plan B. If Pet Face project meet some unconquerable problems, we can then go through these 2 projects.

PS: the reason why we evaluate these projects as this chart comes from the opinion in appendix below.

**Appendix:**

**Some thinking from our teammates when making Final Decision:**

**Wen-Lung Hsu:**

Dating seemed interesting. Nevertheless, considering the data recourse is hard to get (It’s hard to find face pictures from most people because of privacy, and the only possible datasets might be related to celebrity, which is not useful because most celebrities are attractive.) And it’s hard to evaluate whether the recommendation is good or not.

I believe it is an excellent idea for the stock price alert system, and we don’t need to worry about data sources. But I’m not sure whether we should apply computer vision technology in this project since the stock price graphs are visualized from the real price data. It seemed unnecessary to embed the graphs into another kind of numeral data since we already have the price data, which is numeral data.

Therefore, I think the pet project is more promising because we can find useful data resources and reasonable evaluation methods. And it is an issue that requires computer vision technique to solve.

**Runhan:**

I think there are 3 major parts we have to consider when we make a final decision. Accessible in data and tech, Meaning and risk.

Blind date and Pet face are kind of similar. Especially, we can use all of the technology from one of these 2 projects to another project. Moreover, we can even design the blind date recommendations for pets. Considering the risk from regulation, privacy and moral field, pet face is definitely a better choice.

Financial Application is a project with controversy. From my personal opinion and my working experience in the financial market, the major problem of this project is in the meaning part. If you want to make recommendations to your application users, you have to have confidence that your recommendations or your notice can make money. But there is no solid theory that such an analysis from the K-line chart can make money. Chen in our group said she has an alumni who have tried to use such kind of analysis but finally found that he can not make money from K-line chart patterns. So if such a pattern can not make money and there are no academic papers that can support such an analysis, it’s very risky to give users such kind of recommendations or notice.

Then come back to the technology part, we do not need cv technology to find out these kinds of patterns. We can just use the time series data with some algorithm to make the same result. And such methods can be more efficient than CV.

However, the baseline idea of the financial application is great. Although there are a lot of problems in current design, I think this project can be a good project but seems out of our ability. If none of our teammates can make a good design for this project, it will be good for us to put this project aside.

**Taylor:**

First of all, we consolidated the individual lists from the class last Sunday. Then, we chose to stick with our original decision from discussions in class. Right away, we split into three groups and went on to research constraints for each of the candidate ideas to discuss in a meeting on Thursday.

I was personally in charge of the finance application idea. The idea was not exactly sought after, since I personally do not have working knowledge of the particular aspects of utilizing satellite images for investment strategy selection purposes. I decided to conduct a brief survey in my network of finance professionals. I have received some feedback regarding the specifics of utilizing this particular type of data, and it turned out to be not only expensive but also not easy to scale. Satellite images are widely used when deciding for one particular trade in hedge funds and other investment institutions, but not as a generally automated system to solve any general problems.

In the meantime, one of the professional traders in my network suggested an inconvenience he experiences while performing technical analysis on particular stock charts. He suggested that a program that captures the formation of a technical pattern he pays attention to and sends alerts to him would be extremely helpful in his trading workflow. I thought it was a great suggestion and did some research on data and constraints. There were not any particular constraints regarding data access, costs nor lack of end users. This proposal was brought up to the team during the meeting on Thursday. This idea received discussions and suggestions from all departments of the team. Personally, I found it challenging explaining the professional aspects of finance/trading to the technical team, which I assume would be a common issue we run into in the real world. I appreciated all the questions, although a great amount of them were raised from not understanding the concepts in finance. I took the opportunity to practice explaining concepts I don’t usually have to explain in my own network. It was a great learning experience.

Eventually, the team agreed upon the potential technical challenge of capturing real-time patterns and put this proposal on the waiting list, in case our primary project runs into any unsolvable issues and if we have to move to plan B.

Appendix:

Ellen:

1. image restoration for damaged images;
2. Try outfits or make-up online by face recognition;(visual shopping)
3. self visual checking-out; (retail industry)
4. document auto-check for passport, driver licenses; (financial applications)
5. target tracking; (cars)
6. recognize faces on social media; (surveillance)
7. AI used for surgery;
8. remote diagnostics; (both for healthcare)
9. estimate yield;(agriculture)
10. Livestock monitoring;(agriculture)
11. Maintenance auto-check for machines and construction;
12. Warehouse management;
13. Search detail for visual product;

Taylor:

1. c, in detail, to VIX strategy, or interest rates strategies etc.
2. Real-estate property evaluation
3. Facial expression analysis for sentiment of news reporter/ crowd
4. Document information extraction （this maybe in marketing or fashion trends, eg: which color is trending this fashion week?）
5. Can also use online super market product data to detect their change in weights in each sectors(produce has the biggest diversity, or snacks, or healthy food) and local population health status
6. City migration after covid ( effect of work from home) from pollution image in suburbs and city( time series analysis)
7. Satellite image to analyze demographic info to analyze city composition after covid
8. Student body makeup after recent political movement
9. Neighborhood transformation & gentrification after covid
10. Population density analysis (from satellite image) that correlates with covid uptick
11. Analysis of fire in California compared to past years from the color and area of fire
12. Potentially an app scans anesthesia monitor screen and quick analysis of a combined data on patient recovery/worsen judgement
13. Capture of the trend of multiple stocks and quick correlation analysis, but obviously it’s easier with actual data
14. Clothing change in street pictures/same season( time series analysis) for climate change

Wen-Lung:

4. 帳單掃描記帳 (super market receipt…..etc)

6. 截圖字體獲取

7. 掃描轉文字檔

8. 家具模擬擺設

1. 自動駕駛

3. 運動(重訓)姿勢監測

5. 衣服(鞋子) size scan

9. 簡易轉譜 (豆芽菜轉簡譜)

10. 吉他自動抓譜

11. Menu照片轉文字紀錄檔

12. Event.海報照片轉meeting Schedule.

13.自動找車牌

2. 餐點卡路里計算

14. 生鮮選貨品

15. 飲品濃度監測

16.

Yifeng Lan:

1. AI视频换脸API
2. **表情包降噪**
3. 视频降噪
4. 黑白灰色图像着色（老照片还原）
5. 抖音滤镜
6. **真人头像Q版转换**
7. 图像缺失复原
8. 视频动态捕捉
9. 图像特征抓取
10. 无人驾驶汽车自动避让识别
11. **收费站自动收费识别**
12. 超市自动买单的商品识别
13. 图像内容识别归类
14. 图像语意标注
15. 安全摄像头动态捕捉与人脸识别
16. 人脸识别解锁
17. **人脸互换小游戏**
18. **性转小游戏**
19. 穿衣/化妆风格小贴士模拟
20. **生成你的梦中情人**
21. 手写签字生成器

换P图 （换脸）

降噪（去噪/去雾/去模糊/去鬼影）

色彩（修补图片，复原图片，灰度图像着色）

捕捉（动态捕捉，特征抓取）

识别（无人驾驶，安全摄像头，图像内容检索，图像语意标注，自动结账识别）

Chen

1. Medical image (MRI cancer detection, guide biopsy)
2. Facial image (age, gender, race recognition)
3. Entertainment industry ( idol trainees selection, casting for drama or films)
4. Read human writing (signature,
5. Online shopping (style classification)
6. Detect synthetic videos
7. Yoga pose recognition

Circle：

1. 一个怎么投都能投进的篮球框 （利用摄像感应篮球的移动轨迹，然后篮球框会移动到相应位置）

2. 摄像测量仪器 （利用摄像来算出物体寸或者目标的距离）

3. 3D 素描全身变成游戏人物

4. 人脸识别 （整容前后，时间变化）

5. Front Auto Braking (使用摄像头，汽车自动刹车系统)

6. Rear Auto Braking (使用摄像头，汽车自动刹车系统)

7. Lane Departure Detection （使用摄像头，检测汽车有没有偏离道路）

8. Image Recognition （快速准确搜索物品牌子型号）

9. 动作纠正 （能识别你健身或者运动时候的动作正确与否）

10. 摄像语言翻译器 （能把摄像里面的文字翻译成想要的语言）

Yunbai

1. Face Recognition or Synthesis
2. 3D scan modeling
3. Signature Recognition (Bank Security)
4. Medical Diagnose (detect the blood flow, brain structure) Medical Image analysis
5. Auto Driving System
   1. Object detection (detect whether it is trash bag or stone)
6. Retail and Inventory Manage to detect anomalous behavior
7. School: Monitor student behavior
8. Agriculture: capture information about soil and crop
9. Capture information of wildfire and earthquake
10. Emergency detection
11. Credit card recognition (card number, expire date)
12. Blur photos
13. Homeland defense and security
14. Given picture, describe the picture
15. Image Synthesis with artwork

Runhan:

人脸人像类：

1. 找相近异性脸，作为夫妻相，或者用于找理想脸,，用于相亲功能 yifeng 20. mzqr

Circle zhengrongshibie

2. 换脸娱乐？换背景娱乐？ yifeng ~1.17. 18.

3. 根据图像进行作弊坚定

4. 通过照片转换成2d风格的图像，用于头像或者游戏内部的画面建模 yifeng 6.

5.人像识别，用于判断一个空间内有多少人，辅助餐厅，或者超市控制人流

6. 手语视频翻译app circle 10.

7. 医美app，通过人脸识别判断采用什么样的医美手段 chen 1.(Medical use,Ellen, Taylor, yunbai 10.)

物品类：

1. 真假鞋（包，衣物）鉴定app wenlung shi size

2. 衣物识别，找相近衣物用于推荐

3. 通过拍照，找相应风格的家具 wen lung~ 8.

4. 对烧的菜肴进行评分的app wen lung caipu zhuaqu

5. 图像转文字识别app yifeng 13.14. Chen 4.

自然类：

1. 识别动物和植物的app，在照片中找出隐藏的动物和植物，用于生态教学

2. 宠物表情或者状态识别app :)

3. 通过照片识别地点和路况的app

4. 通过识别天空照片，进行天气预报

记录：

1. 识别账单，用于付费（信用卡识别，护照识别）

2. 健身动作纠正，运动动作纠正

3. 农业应用

Taylor: Satellite Image Analysis for Investment Strategies, in detail, to VIX strategy, or interest rates strategies etc. W T C

Chen: 练习生选拔，影视选角 Y

Ellen: document auto-check for passport, driver licenses; R E

Wen-Lung: 寵物表情，毛小孩才是忠實伴侶:P（T R E Y W， YB C

Final decision:

1. Blind date
2. Pet
3. Satellite Image