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Sports Gambling: Software Design

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SPORTS GAMBLING: SOFTWARE DESIGN

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Abstract

Sports gambling has been an attractive controversy for a long time. Fantasy sports, similar to most sports lotteries and gambling, allows customers to put bets of their choices of players and win certain rewards according to the real game data in each famous Sports League such as NFL, MLB, NBA, etc. Although Fantasy sports has always been at the forefront of legal issue discussions, it has become a popular activity of Americans. Even media are invading this grey industry to support data analysis and news for citizens' pleasure. Despite the negative influence of sports gambling, there are several bright aspects of Fantasy Sports. It is a good activity between friends and families instead of letting vulnerable people such as kids be influenced by illegal sports gambling. In addition, in place of letting illegal sports gambling companies overseas, which will benefit the U.S. economy, to grab market share, it is better to create a legal and popular sports gambling application through PC or other mobile devices to draw public interests. This study attempts to design a Fantasy Sports application for those traditional prosperous gambling industries such as Casinos in Las Vegas or Casinos in Macau to support Fantasy Sports. A software development process and development tools are introduced in this paper and the prototype of the application are created as well in this proposal.

Keywords: Sports Gambling, Fantasy Sports, Software Design

Introduction to the background of Sports Gambling

Where there is a human, there is movement. Along with the long river of human history, sports are an integral part of human beings. Back to around two to three thousand years ago, the Olympics in ancient Greece shows us the spirit within sports. Certainly, sports always show positive aspect to the public, bringing positive emotions to everyone in daily life. Nowadays, sports have been divided into many types, i.e., all kinds of ball games such as basketball, football, soccer, tennis etc. These sports games have their unique charm to make people participate in them. Some individuals with an elite-level sports talent can become professional players. Professional sports draw public attention widely nowadays. Even the so-called amateur college sports, the NCAA, drives American sport fans into frenzy. Along with the broadcasting of sports, sports spectators are cheering, laughing or crying and angered for the winning or losing of their teams or individuals. What's more, people participate in sports and spend money in buying sports equipment, training, watching sports, and playing sports games. The sports market generates huge profits every year.

Sports gambling or sports lottery, which is when gamblers bet on certain teams' or individual athletes, is popular in America. Specifically, gamblers can bet on certain Team's winning or losing, on how many points, or betting on certain number of scores in a certain amount of time, and then those gamblers win or lose money according to the odds provided by sports gambling companies.

The odds offered by sports gambling companies are thoughtful; they use statistics and calculate the chance of winning of sports teams or individual athletes.

To draw gamblers' interests, the odds are attractive which makes gamblers want to take risks and bet on the dark horse in an attempt to obtain a handsome gain. Some of them succeed and get addicted to sports gambling more and more, and the people losing money are trying to get their money back by wagering continuously. No matter whether gamblers are winning or losing, sports gambling businesses are happy to have more and more sports gamblers to participate in their games.

At present, sports gambling is a popular activity that a substantial number of sports fans have participated in. Nevertheless, people hold different opinions towards internet gambling (LaPlante, Schumann, LaBrie, & Shaffer, 2008). Regardless of opinions to sports gambling, the popularity of online gambling is growing very fast.

Rationale of Sports Gambling Study

Sports gambling has become a wide public concern in recent years. More and more researchers are interested in sports gambling issues. Sports gambling is an interesting topic that researchers can investigate from many different angles such as the legal issues and cases of sports gambling business, gamblers' gambling behaviors, the statistics of analyzing gambling odds, and sports gambling of certain types of sports or certain sports organizations.

Gambling has been regarded as a negative activity by the public through the ages. Aforementioned, sports bring a positive attitude to human beings. It seems that sports gambling creates an exact opposite. Most psychological valences born from gambling are negative emotions such as addiction, anger, and aggression, which can lead to crime.

Although much research has been done within the sports gambling domain, there is minimal research

focused on the computer science aspect combined with sports gambling. As sports gambling relies

greatly on instant transmission of information, which technology has become a significant part,

computer technology is a field to research further to help us analyze the current situation and the future

trends of sports wagering.

Due to this minimal research of sports gambling on computer science technology, this study explores a

set of sports gambling applications' development processes relevant to the computer science area to

propose a computer system that can be used in legalized sports gambling. This research aimed at looking

into previous research and then trying to combing sports gambling Phenomena into the area of computer

science.

<div align="center">**Literature Review**</div>

Background of Gambling

Gambling has a long history. Commercial gambling has existed in America for decades. The first

legalized casino was built in Nevada in the year of 1931; then, the second legalized casino was built at

1976 in New Jersey (1997). After the year of 1989, there was a rapid growth of legalized casinos in

many other states. Since the Internet has become an indispensable part of human society, commercial

gambling takes advantage of the popularity of the Internet to make gambling more accessible to the

public, which is Internet Gambling. The combination of Internet technology and gambling allows every

individual to participate in gambling wherever they have Internet technology access by using all kinds of

electronic devices. It makes gambling more accessible and more convenient for everyone. However,

problems come along with this convenience like lack of regulatory schemes. Actually, according to the

data from Wood et al. (2007), nearly thirteen percent of online gamblers choose online gambling

because of its convenience and accessibility.

Internet Gambling VS. Traditional Gambling

Why does internet gambling continue to gain more and more popularity over traditional gambling

casinos? Special and distinctive features of Internet make it different. Gambling online is easy to access,

instant and user friendly. Gamblers can stay on those gambling sites all day long with different

platforms (Gainsbury, Wood, Russell, Hing, & Blaszczynski, 2012). A study conducted by Gainsbury et

al (2012, p. 1390), and Cotte et al (2009) found that "Internet gamblers engaged in this mode of

gambling in a distinctly different manner than terrestrial casino players. Internet gambling appears to be

integrated into everyday living activities, involve the whole family, but also be used systematically in a

more competitive and less social manner."

Public Concern of Internet Gambling

We have a well-settled legal system in the real world, but unfortunately, not in the virtual world. The

booming of internet gambling has raised a serious public concern to the society (Hammer, 2001). Unlike

traditional gambling, online gambling is much more accessible than entering into a traditional casino.

One major issue of online gambling is that there are few effective ways, if not none, to classify and

screen users. Additionally, although certain teenagers may not intentionally go into online gambling

websites, online gambling advertisements can still lure those teenagers easily. Online wagering exposes

teenagers to an addictive, negative online experience.

Some predict that the number of addicted internet gamblers will grow from 5 million to 20 million in

America very soon, and the Internet contributes this rapid growth of gamblers (Hammer, 2001). Internet

makes online gambling easily accessible. What's more, minors that are interested in video games and

good at computers can easily become addicted to online gambling. Many online gambling companies

are using some kind of age validation process to prevent teenagers from participating in online

gambling, and some of them will ask for credit card information and send a confirmation message to

verify customers' ages. Even so, some minors still have ways to access online gambling, such as using

their parents' credit cards without authorization. In addition, those websites requiring credit card

validation systems are not the majority; many websites allow anyone to have access to it without any

form of validation process. The combination of internet and gambling exposes teenagers to a harmful

environment that negatively influences their educational development and growth during adolescence.

Internet Gambling Will Not Boost American Economy

Hammer et al (2001) hold the opinion that internet gambling will not help the American Economy to

grow. First, the Internet gambling will reduce job positions in traditional gambling environments.

Second, many of the companies behind these internet gambling websites are not in America, they can be

everywhere in the world, and they do not pay tax to the United States. Third, when traditional gamblers

lose money, they will not feel as upset about losing money, because they are aware of the fact that

traditional casinos may improve the regional economy.

The author illustrated that it is like buying lottery tickets; some part of the money from those customers

will be used to help the education system or infrastructure construction. Unlike traditional gambling,

internet gambling will not do such things. Fourth, Hammer et al (2001) raised a concern that gamblers

using credit cards to participate in betting online will put banks in an unstable situation. Those credit

cards are posted as cash advances on the gambling websites and will be charged more interest, which

can exceed 20%. Moreover, it is a problem for banks that when someone loses money by using credit

cards through online gambling and are unable to pay the debts.

The Fear of Fixed Game

Paul and Weinbach (2010) illustrated a concern of negative influence of the rigged game. They argued

that nothing could destroy the fans' loyalty to a game as fast as the fear of corruption in the game. Fixed

games are sometimes related to sports gambling or sportsbook. There are many ways to fix a game, such

as deciding the game results before the game, black referees, or using drugs to increase players'

performance.

Additionally, one of the other ways to fix a game is by points shaving. Points shaving means the team

that is stronger tries to win with fewer points than the point spread. Paul and Weinbach (2011) explained

that point spread refers to when a strong team encounters with a weak team, the stronger team must win

by a certain point to make the wagers who bet on the stronger team to win. They mentioned that this

phenomenon is serious in the NCAA, because there is a claim from Forest and Simmons (2003) and

Szymanski (2003) that players and coaches who receive low revenues are likelier to participate in game

fixing, especially college basketball. If caught, this would ruin a famous player's or coach's future

career and public confidence on the entire industry.

Legal Aspect of Sports Gambling

Most online gambling is illegal, as well as most offline sports gambling. Along with the popularity of

sports, sports gambling has become a large industry. Sports gambling is defined by federal law as

wagering on human athletic contests and animal races (Cabot, 2010). Among those animal races,

horseracing is the most popular animal racing for gambling. However, according to the data collected by

Cabot, (Cabot, 2010, p. 271), "Wagering on U.S. races was down $1.35 billion to $12,319,129,673 in

2009, a percentage drop of 9.9%. Hurt by the overall ailing economy, as well as industry-specific issues,

the decline represents the sharpest drop in more than 25 years."

On the other hand, there is a kind of gambling called deposit wagering: this form of gambling is growing

fast (Cabot, 2010). Deposit wagering is an off-track wagering, which allows users to deposit stakes on

their account and making bets through remote devices such as computers and mobile phones.

Sports gambling includes team competitions and individual competitions. "Professional and college

sports are the most popular sports for gambling which estimated annually at $80-100 billion and $60-70

billion, respectively (Cabot, 2010, p.272)". Among those gambling ventures, the legalized gambling is

less than one percent on human athletic events. There is a data set from 2008 showing that gambling

arrests by the FBI has dropped by ten thousand since the year of 1994. In contrast, the amount of illegal

gambling has increased significantly (Cabot, 2010). Cabot (2010) has listed many factors causing the

arrests to decline such as the lower enforcement rates, meaning, the fact that the FBI puts more attention

on crime that is more serious and so forth. One of the interesting points he presents is that highly

developed technology has made it hard to detect and regulate those law breaking gambling operations.

Another point that the author presented is the general public's belief that online gambling is not a crime or it is not wrong at all.

Considering why the public widely believes gambling is not a crime, Cabot (2010, p.274) explains that during the NCAA basketball tournament and NFL super bowl, "media has contributed to the public perception of sports gambling as an enjoyable and legal pastime." Cabot (2010) mentioned that the gambling on Fantasy sports is very popular. The public generally feels enjoyment when they are wagering during a sports event and do not consider it as a crime at all. In addition, the media such as newspapers and on the radio are posting the points spread. Sports gambling is a trend, and the media support the spread of sports gambling, and, as aforementioned, there is an opinion that some people do not consider gambling as a criminal behavior at all. As the example of alcohol prohibition in the 1920s, the public would not respect the government if the government fails to regulate such popularity of sports gambling.

Cabot (2010) mentioned a concern that when sports are combined with gambling, the score of a game always matters. A player can also participate in sport gambling and use a strategy such as missing some good chances to score or giving up to win for a substantial income. The public has no clue whether these players are taking part in sports gambling to earn money or they are just physically exhausted. This problem is especially outstanding among human athletic contests.

In addition, the current NCAA business model based on amateurism makes the case that sports gambling affects the competitions significantly even more than professional sports. This is due to the reason that making money is far more attractive to student athletes who is not paid for playing sports. Besides, the internet provides easy access to sports gambling. In addition, youth are more likely to take a risk to participate in such illegal activity.

Horseracing is treated differently, and horseracing is not included in the Professional and Amateur Sports Protection Act (PASPA). Also, Paul and Weinbach (2011, p.310) claimed that horseracing is quite different from professional sports gambling, which is "pari-mutuel, as actual betting odds are only determined after all wagers have been placed". Congress figured out another way to influence horseracing gambling, which is the Interstate Horseracing Act ("IHA"). This is an act to prescribe rules for off-track betting (OTB) horseracing between states.

Evidence showed that horseracing does not relate to scandal as much as other kinds of sports have. In addition, people who initiate a ban of sports gambling do not include horseracing. Most of all, the whole horseracing industry relies upon wagering in the event.

In Cabot's article (2010), several acts were mentioned, such as the Wire Act, the Unlawful Internet Gambling Enforcement Act (UIGEA), the Travel Act, and the Illegal Gambling Business Act. These laws apply to both human athletic events and horseracing events that happened within states or between two states or even out of America.

He presents the Wire Act as following:

> Whoever being engaged in the business of betting or wagering knowingly uses a wire communication facility for the transmission in interstate or foreign commerce of bets or wagers or information assisting in the placing of bets or wagers on any sporting event or contest, or for the trans- mission of a wire communication which entitles the recipient to receive money or credit as a result of bets or wagers, or for information assisting in the placing of bets or wagers, shall be fined under this title or imprisoned not more than two years, or both.

In Cabot's words (2010), this act is vague and incomprehensible. Actually, he regards it as a terrible law. However, it does have force on certain cases such as the 2002 Jay Cohen case; in the case, the court opined that although the defendant company was in Antigua, the gambling took place in a part of the U.S.A., which constituted a violation of the Wire Act.

The public has debated on the Wire Act for a long time, and the Wire Act, according to the court, only restrict the commerce which are between states and out of America, the commerce within single states might not be regulated. Actually, telephone gambling has existed in Nevada for years. In addition, the department of justice explains that internet gambling, which takes place out of the United States, is lawful and should be distinguished with "foreign commerce" between a foreign country and American states. Therefore, the wire act does not restrict those internet gambling behaviors which occur outside of American territory and has no relation to American players who are physically present America. Another issue is how the Wire Act affects horseracing, which is definitely a type of sporting competition.

The Social Impact of Internet Gambling

Internet gambling, without the obstacle of the legal system, would grow extremely fast. It is likely that

the regulations on internet gambling will soon be relaxed (Gainsbury et al., 2012). The current gambling

industry greatly relies upon technology, which continually seeks market opportunities. Internet wagering

presents a fast developing trend nowadays (Griffiths & Parke, 2002). Highly developed electronic

products and internet increases the amount of time spent on home activities. Because of internet

gambling, the trend of family entertainment has changed. Due to the reason that digital products provide

appealing leisure activities and information, the demand of outdoor activity has declined dramatically.

Researches refer to these kinds of patterns as "cocooning" when certain families spend leisure time at

home, and mostly that they rely greatly on indoor activities (Griffiths & Wood, 2000). Social activities

through internet and leisure time spending on watching television has replaced the outdoor activities of

many families nowadays, especially among young families. Because of the fast development of online

gambling, home wagering may become an essential part of family leisure activities in the near future.

This circumstance draws public concern. Griffiths (2000) analyzes this situation and illustrates online

gambling as a social harm linked to various problems such as the addiction to gambling.

Protection of the Vulnerable

In Griffiths' research, he mentioned that vulnerable people should be protected from internet gambling.

This should be the responsibility of those people who are working in the gambling business.

Nevertheless, those Internet gambling businesses rarely implement access validation. Griffiths came up

with some questions about how to prevent teenagers from internet gambling. How can we distinguish

whether a person was conscious and was not using drugs or alcohol while he or she was gambling?

Also, there are possible situations that blocked gamblers, by any means, switch to another platform, such

as gambling apps or integrative websites (Griffiths & Parke, 2002).

Internet Gambling in the Workplace

Current online gambling businesses make it easy to permeate the work place, because the internet has been become an essential part of the working environment. There are increased companies allowing their employees to bring their personal computers to the work place and have access to the internet as well. In this case, the efficiency of employees' work may decline and making the wholesome working environment in danger (Griffiths & Parke, 2002).

E-Cash

Along with the development of technology, people use cash less and less. Credit cards and Pay-pal have become a common form of payment. Currently gaining popularity are third-party payment methods such as Apple pay, Ali-pay (China's leading third party payment), Google pay etc. The money in those accounts are only shown as numbers. Using money by these methods makes people insensitive to the outflow of money. There is no way to use traditional cash with online gambling when users are gambling online with virtual account. It is very easy to spend too much money before they realize it. A similar trick is used by casinos, which are chips that have replaced traditional money. It makes people lose the sense that they are actually wagering real money.

Griffiths mentioned a theory called "suspension of judgment". It mainly reflected that gamblers are seeing less value of e-cash than paper cash psychologically. It resulted in a disruption of gamblers' perceptions of financial security and will provoke continuous gambling behavior (Griffiths, 1993). This phenomenon is commonly noticed in various sectors of the gambling business and commerce. The same

theory applies to Internet gambling as the casinos are using chips and the slot machines accept tokens (Griffith 2002). The real value of money has been concealed in these tactics. Gamblers are spending these chips, tokens, and e-cash more lavishly than using paper cash. Evidence proves that people are willing to spend more money (Griffiths, 1999).

Exploitative Practice

The exploitative operation of some internet gambling companies calls for public attention. The authenticity of those internet gambling companies is the major concern. Some unscrupulous actions are embedding, circle jerks, and online customer tracking.

"Embedding" is one of the typical methods used by those gambling companies. By using meta-tag, those companies hide key words into meta-tag, which allows users reaching their websites by entering those key words in the search engine. Moreover, embedding some high frequency searching words into the meta-tag will increase the visitor count. If people enter some key words like "how to quit gambling", the key words gambling may give out a search result of some gambling websites. This would not help those people quit but let them be addicted more and more. What's more, there is no specific law to restrict this kind of predatory practice.

"Circle jerks" is another unscrupulous practice. Many internet users may have the experience with "telescoping windows" which is the technology called circle jerks (Griffiths & Parke, 2002). Those websites using circle jerks always pop up similar websites to the visitors. In some even worse situations, it makes people have no way to eliminate those annoying web pages but to force the browser to shut

down.

According to Griffiths (2002), the public worries mostly about their personal data. Actually, some

websites have a technique such as online customer tracking. They use this technology to collect users'

data and accessing visitors' profiles. According to the data, they can figure out a lot of information such

as personal interest, such as what type of online gambling they are playing and the amount of wagering

fee from their account. Having that customer data helps internet gambling companies to obtain latency

clients, and to detain old clients. Those companies who have a repository containing all customers' data

is more advantageous than others are. Not only are internet gambling businesses using customer tracking

but also other businesses have done this as well. This may draw public concern about the safety of

customers' personal information. Customers' privacy is being threatened because their personal data is

disclosed to marketers without warning.

The technique of gathering, filtrating and analyzing customers' personal information are actually being

used on the Internet by many companies, which have business with a large population of customers.

With this technique, those companies know customers better than they know themselves. They know

what their customers' interests are, when they are working and resting, etc. Actually, if some powerful

companies want to dig into someone's personal profile, the current technique allows them to obtain very

detailed information about the person.

Amusement: The Positive Effect on Kids

Amusement can be segmented into two different ends the positive side and the negative side (Agina, 2012). A positive amusement helps developing kids' IQ and educate them as well. While negative amusement has an opposite effect on kids such as violent images, pornography, and gambling. These things have a bad effect on children especially those vulnerable ones.

Agina etc. (2008, p.1087) illustrated one idea that "the research, then, should pay attention to how to positively conveying that negative behavioral regulation into children's learning process in order to enable children to become self-arousal learners given the fact that children do not only feel, but also 'taste' the arousal when playing against the rules."

Most gamblers choose wagering online because of its convenience such as ability to quickly connect to the terminal anywhere and the low cost of entry (Agina, 2008). Data from Miniwatts Marketing Group (2001) collected in western countries showed fifty-eight to seventy-eight percent of gamblers are gambling online because of such reasons. What's more, the cheaper and cheaper electronic devices such as telephones and software makes it way easier to connect to gambling websites or terminals where there is a Wi-Fi or any kinds of internet network offered by those mobile companies. Thus, because users are relying more and more on this kind of personal electronic devices, and many mobile companies and software companies promise to protect users' privacy, less customers are on guard of the leaking of their personal information. Data supported by researchers through an internet casino (Gainsbury et al., 2012) showed that two hundred and seventeen ways offered by those gambling websites to transfer funds to their gambling accounts, including traditional bank account and third party service providers.

In addition, internet gambling companies are using all kinds of models to teach how to gamble online in an attempt to keep drawing newbies. Instructions can be done gradually in detail by those gambling businesses, and a free entry to sign up, as members are always an efficient way to attract new customers. Additionally, communications and comments among gambling companions are available as well. The amount of betting is not limited as well; either small or larger amount of money is accepted. The Internet gambling sites change their interfaces into different forms to suit different consumer groups according to their age, race and gender. Monaghan and Derevensky (2008) argued that people would play online gambling more often and teenagers are likely to be affected easily by online gambling.

The Profile of Gamblers

Data collected by Gainsbury et al. (2012) found that almost fifty percent of online gambling players are more likely to play racing wagers, while thirty-nine percent of gamblers like to play sports gambling, with others such as poker, or the lottery. Among those people who have played all those games, both sports gamblers and races gamblers present at around seventy percent while around a proportion of fifty-five percent of players participate in poker and about fifteen percent of them are willing to buy lottery through the internet.

Steps of software designing

It is not easy to design a software. Designing a software is a complicated and time-consuming process. During a program design lifecycle, programmers customize software for clients. There are situations that programmers are often changing their design according to customers' requirements and some other limitations. The design process is unstable and complex, while the requirements of customers are always

idealistic. It is imperative to make the right decision of choosing what software development

methodology is used (Tang, Aleti, Burge, & van Vliet, 2010).

It is essential to know that building a software is not simply about writing some code and then it is done.

To begin with the software development, software developers talk to their client about what they want

the software to be and what is the major functions of the software. Then a development methodology is

needed. Most companies use the methodologies, which are public; some companies use their own

methodology.

Awad (2005) divides those methodologies into two categories: heavyweight and lightweight. In Awad's

word, the heavyweight methodology refers to traditional methodologies; the most classical traditional

methodology is waterfall that I will only discuss and compare it with agile methodology.

Waterfall Development Methodology

No one created Waterfall methodology. It is a method such as constructing a building from the bottom to

the top according to normal steps and then defined as Waterfall. Every step is in a sequence in a

development methodology. It will not move to the next step until present work is done (Ruparelia,

2010). The steps of waterfall methodology in software design are Requirements, Analysis, Design,

Code, and Test. The name of each step may be defined differently. Nevertheless, the first step is always

to gather the requirements from customers, knowing what the program will do (Awad, 2005). Then

developers decide how to design the software. The third step is about writing the code. Once the code is

completed, the next step would be the test. Implementation is the last step.

Requirenment

Analysis

Design

Code

Test
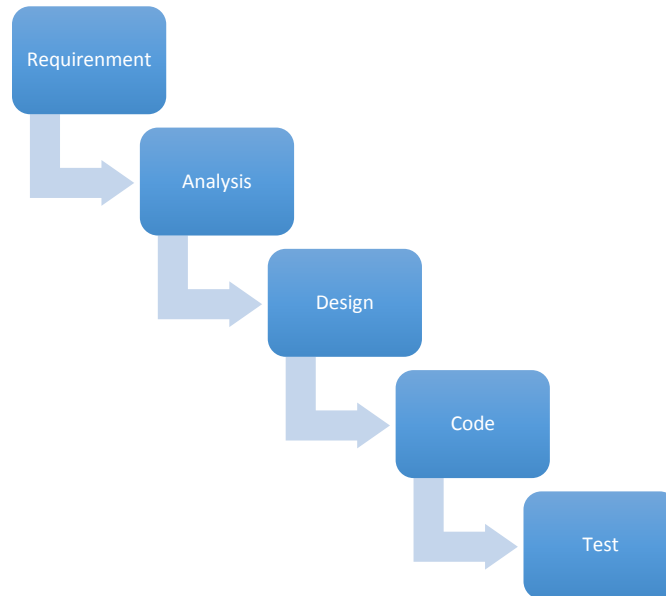
Advantages of Waterfall

The important factor of Waterfall methodology is the plan of the project. Thus, it is essential to have a

clear plan before starting the project (Mikoluk, n.d.). Waterfall methodology requires a large-scale plan

at the beginning, and then it can start. Once the document is ready, the software can be launched soon.

What is more, the budget and the time used by the project is predictable.

Limitations of Waterfall

The Waterfall development method is not flexible and rigid. Once the project starts, it would be a

paranoia, and it is almost impossible to make any change to the project after a certain step is done. It is

better to make sure the plan is right, as once the project starts, any change may result in undesirable outcomes.

Agile Development Methodology

What is Agile methodology? Different people have different opinions. However, one thing in common is that developers are generally satisfied with Agile, and the users of Agile are increasing (West, Grant, Gerush, & D'silva, 2010). Agile is a method totally opposite to Waterfall method. Agile breaks the project into iterations; each iteration is a life cycle that contains steps such as Requirements, Analysis, Design, Code, and Test. It is okay for customers to change opinions. Because there are many iterations, developers can contact with customers more often in case customers have changed their minds. Moreover, no clear and specific plan is needed for Agile method, because the plan is always allowed to change. At each ending of the iteration, pieces of working software are always guaranteed.

Advantages of Agile

Agile is more flexible than Waterfall; it is like a freestyle method to build a program that no one knows how the program would be like at the end. However, because working software is delivered after each iteration, it has less risk than the Waterfall method. In addition, clients are always welcome to add comments on how the software is, and then developers can do development according to their inputs. The advantages of breaking the project into small pieces and putting into iterations allows developers to respond to clients' changes quickly and efficiently (Highsmith, 2013). When dealing with the clients who even have no idea what the program should be like, developers should use Agile method instead of Waterfall method. Along with the advancement of the project, the clients' requirements can become

clearer. What is more, it is a good method to try new software design. At last, Agile focuses on

teamwork extremely. The technology of version control is always being used by the Agile method, and

software developers are working on different modules. Communication is always essential for software

developers to cooperate when working on each module.
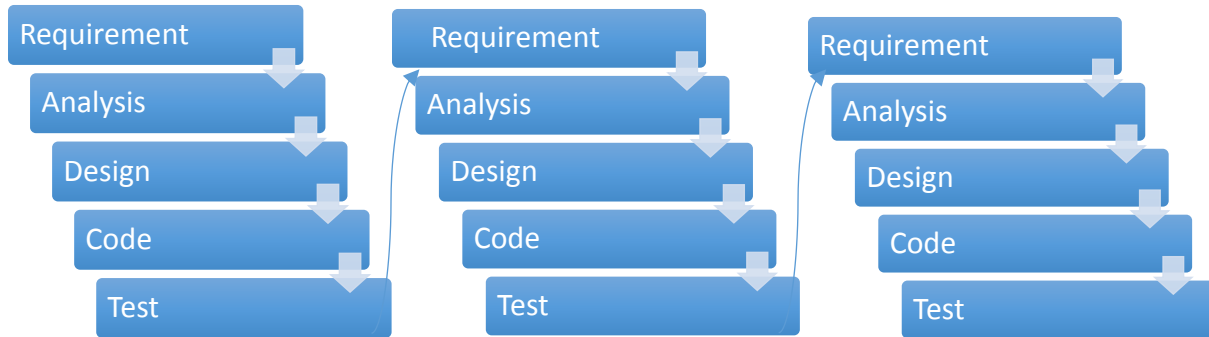
Limitations of Agile

Despite the flexibility, one of Agile's drawbacks is that it is not as structured as the Waterfall method.

The budget and time are not predictable. The plan of the project is vague and indistinct. Because of the

indistinct plan, the software design is really relying on the thoughts of software developers. If a

developer departs from the design process at half way, it would cause a real headache to the whole team.

On the contrary, Waterfall is based on the plan, and staff change will not cause serious problems.

Design Patterns

Design patters are always important in software design; it provides a way to solve problems, which occurs very often during a software architecture process. Hence, the design patterns can be used repeatedly. The design patterns are not completed designs that can immediately turn into code, which are templets that suit many conditions. Design Patterns are formal practices that software developers believe are the most efficient to cope with puzzlers when architecting a system or software (Keutzer, Massingill, Mattson, & Sanders, 2010).

In the author's opinion, building software is equivalent to cooking, and design patterns are the cookbooks to guide the developer to success.

Framework of Software Engineering.

The structure of Software Engineering can be summarized as objectives, principles and methodologies

(Kitchenham & Brereton, 2013)

The objectives of Software Engineering

The objectives are generating a sophisticated and usable product with correctness, availability, and

budget friendly features. Correctness means the software should meet the expected functions, which are

the requirements from customers. Usability refers to the basic structure. Software realization and the

extent of the documentation is available for the user. Budget friendly means the software developed

never exceeds the budget and satisfies the customers. To achieve these goals, many problems either in

theory or in practice are waiting to be solved. It constraints the process model and the software

development method.

The Process of Software Engineering

It is a process to produce a final product, which can meet the requirements and steps needed to achieve

the goal of software engineering. Software engineering processes mainly includes the development

process, operation and maintenance process. It covers the requirements, design, code, test,

implementation, and maintenance activities.

The Principle of Software Engineering

The principle of software engineering refers to the principle, which must be followed during the process of engineering design, engineering support, and engineering management.

1. Choosing the proper design patterns

This principle is about the design of software. During a software design, the hardware requirements are as important as the software requirements, and some other factors may be included. It is a relationship that those elements depend on and restrict each other. Software developers should always consider it. Hence, software developers aware the mutability of requirements by choosing proper templates to make the development of software fulfill the customers' requirements.

2. Choosing the right software development methodology

As aforementioned, there are two major development methodologies, which are lightweight methodology (such as Agile) and heavyweight methodology (such as Waterfall). Considering the security, flexibility, time, and modules, different methods have different advantages.

3. Enhance the quality of technique support.

Good tools are a prerequisite to the successful execution of a job. A good environment and good software development tools are especially essential to software engineering. The quality and expenditure of the software development project is directly influenced by the support from the software engineering (Braude & Bernstein, 2016).

4. Attach importance to the management of software engineering

The management of software engineering directly influences the effective productivity of software and the effective use of sources.

Introduction to Development Tools

JavaScript

JavaScript is the most popular programming language in the world (Flanagan, 2011). It can be used in HTML and Web. It also can be widely used in multiple platforms such as PC, laptops, smart phones, and tablet PC, etc. (Flanagan, 2011). JavaScript is a computer language, which is different from Java and C, etc. Although JavaScript seems to have some relationship with Java, it only has a similarity of the name.

The original JavaScript which was created by its father Brendan Eich in only ten days was called LiveScript (Severance, 2012). JavaScript is a front-end scripting language, which can be embedded into HTML; once it is embedded in HTML, web browsers could run the code directly. With JavaScript, the web could have dynamic functions and respond to different actions from users (Rauschmayer, 2014). For example, without JavaScript, the data such as a form submitted by users will send to the server and return it back by the server to notify the user that he or she has left out the Gender selection and will ask to please select the gender and re-submit it. The process is sending the form to the server, which could be located at thousands of miles from the user, and then the server sends a message back to the user to notify him or her what has been left out. It is a waste of time and source. With JavaScript, the embedded code in the front-end web could check the form to see which information has been left out and to notify the user by the web browser directly.

Advantages of JavaScript

As a scripting language, JavaScript is relatively safe. It will not view local discs neither save data into

the server. In addition, JavaScript relies on web browser; it has no relationship with operation

environment. Once the code is written in JavaScript, it can run anywhere. JavaScript is extremely useful

to verify data. JavaScript can reduce network traffic (Rauschmayer, 2014). Before JavaScript scripting

language, as the example aforementioned, the traditional data submission and validation work has to

transfer to the server. If the amount of data is too much, it is a waste of network's and server's resources.

In addition, JavaScript can easily manipulate a variety of objects in web pages; users could use

JavaScript to control the appearance of various elements of the web pages; JavaScript also allows users

to customize the browser based on their needs, so that the web pages could become more user-friendly

(Flanagan, 2011). Lastly, JavaScript supports distributed computing. JavaScript allows variety of tasks

completed at the front-end client server without the participation of network and server, so that it could

support distributed computing and processing.

SQL

SQL, Structured Query Language, has main functions which is to establish relationships with various

databases to achieve communication with those databases (Oppel, 2009).

SQL statements can be used to execute various operations, such as updating the data in the database,

extracting data from the database and so forth (Oppel, 2009). The major SQL commands, such as Select,

Insert, Update, Delete, Create, and Drop, including the standard SQL commands, could be used to

complete almost all database operations.

SQL is a language that communicates with computers to let the computer understand what results the

user is expecting to extract from the original database rather than telling how to get the result. For

example, a simple statement of SQL can be written as follows:

<p style="text-align:center">SELECT first_name, last_name FROM employees WHERE salary > 10000</p>

The example above is so simple to understand that we do not care how to get the results, but we care

about the results of those employees with a high income.

<h2 style="text-align:center">Feasibility Analysis</h2>

The purpose of doing feasibility analysis is to examine whether the software can be done in a certain

amount of time or if it is worth the time and effort. I will examine it at four aspects as follows:

Technical Feasibility

The software will use the database SQL server to do background database management and

maintenance. UI designer could use Photoshop to deal with interface design. To do the design of wire

framing and Prototyping, I chose to use Axure RP 8, which is powerful and is easy to use. What's more,

as a scripting language, JavaScript allows the interaction process to be faster and effectively enhances

user experience. I also chose PowerBuilder since it cooperates with the SQL server really well.

PowerBuilder is an integrated visual development tool. SQL server and PowerBuilder could deal with

database development and system interface design really well. Besides, those tools above are widely

used by software engineers; it fully illustrates the feasibility in technical aspects.

Economic Feasibility

There are different ways to play sport gambling as we mentioned before. Fantasy sports, as they claimed, is a game of skills rather than gambling. Fantasy sports have become a leisure activity between friends and families. It is a good pastime for sports fans when they are watching their favorite sports. What's more, as we aforementioned, sport gambling companies, whose headquarter is located in another country, could reach American citizens to play their game, and they will not pay taxes to the U.S. government. Although some of those popular illegal sport-gambling companies may be forced to shut down by the Court, most of them are still active. Gambling funds in the United States, which are supposed to flow to Sports Lottery and Betting in domestic legal companies, flow to those foreign illegal sport-gambling companies instead. Although we cannot prevent this from happening because of globalization, we still could do something to draw domestic sport gamblers' attention. In my opinion, designing some powerful, user-friendly and popular sport betting software for domestic casinos are necessary.

Operation Feasibility

The software is designed in a clear structure, and it is easy to use. Every step and button click are fully functional and easy to understand. The software will save users' username and password or selections such as the draft list in the client server automatically for the next use. As user-friendly software is more and more welcomed, a handy and powerful software like this would gain large popularity from sports fans.

Law Feasibility

As gambling is an illegal activity in some States in America, I chose to design a sport gambling software for Casinos in those gambling cities such as Las Vegas. Wagering fees in those casinos are huge every day; a new branch for online wagering fee is reasonable to add to the whole gambling system. In this way, the cash flow could be legal. Moreover, we can contact the Court in America to check its legality to get a legal certification before we launch the software. Like other fantasy sports did, they set the sport gambling business at the borderline between legal and illegal. The most important thing is to get the admission from the court.

Software Requirement Analysis

System Analysis

The system should have functionalities as follows:

1. Log in and sign up

   User enters username and password in the log in module. The client server checks whether it is in the right format or not. If the format is correct, the username and password will be sent to the server to validate user information and then send back the data which either lets the user log in or a deny message with the reason is shown to the user. Furthermore, there are connections both at the sign in page and sign up page in case a new user enters a sign in page without log in information that he or she does not need to go back to the home page, but he or she can click the sign up button below to enter the sign up page. The same logic also suits the sign up page, which has a connection directly with the sign in page.

2. File management

It stores the information of registered members including the username, password, gender, date of birth, address, phone number, betting history, photo album, friends list, and current balance, etc.

3. Money management

It is a gambling software, so the cash flow is huge, and it is necessary to set it up as a unique module to develop. The money management is the online wallet of the client; it allows the client to add money in it through credit cards, pay-pal, checking and some other third party payment platforms. It also shows the income of wagering fees and a history of cash flow, and it is ready to view at all times as well.

4. Chat room

It allows the user to add friends in the game and chat with friends through the chatting window or enter the public chat room. It also allows the user to check friends' stats such as online status, basic information, and winning history if his or her friends set it as viewable.

5. Sports Catalogue

This software has limited sport types such as Fantasy NBA, Fantasy MLB, Fantasy NFL, Fantasy NHL, and Fantasy Horse-Racing. All those sports are the most popular sports in the U.S.A currently. Each sport type is a sub module and will develop more sub module functions. In addition, since the European cup is very popular as well, it can be added into the program in the future.

6. Sub module of each sport

   The sub module of each sport is different for sure, but there are some common sessions such as

   the draft, the news and videos, sport analysis, etc. Then based on different play modes and

   unique features of each sport, functions and modules could be added individually.


7. Searching engine module

   This module allows the user to search a specific player's status, and it has a drop list of result

   type such as player's data analysis or news.

8. System maintenance

   The main function of this module is the database system backup and other operations, while

   preventing the loss of information other than the destruction of the database.

Software Prototype Design

Figure 1-1
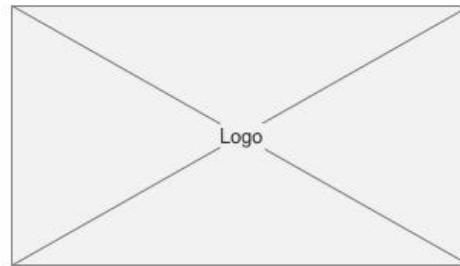
This is the very first page of the software; like other applications, the first thing a user should do is to log in into his or her account. At the very top, a logo area could contain dynamic images, logo and the name of the fantasy application. There are two buttons in this page, which are the Sign in button and the Sign up button. This page could be further processed so that the application looks more aesthetic than this simple structure.

Figure 1-2

Above is the Sign in page. Once a user clicks the sign in button, the Sign in button will lead the user to

the sign in page to enter his or her Username and password. Then, the next button will lead the user to

the home page if the username and password is correct. If the customer does not have an account, he or

she could click the words at the bottom to go to the sign up page.

Figure 1-3

The content of a sign up process is as normal as other applications. In addition, a customer who already has an account could transfer to the sign in page with the Sign in words at the right bottom with a number "2" corner mark.

Figure1-4
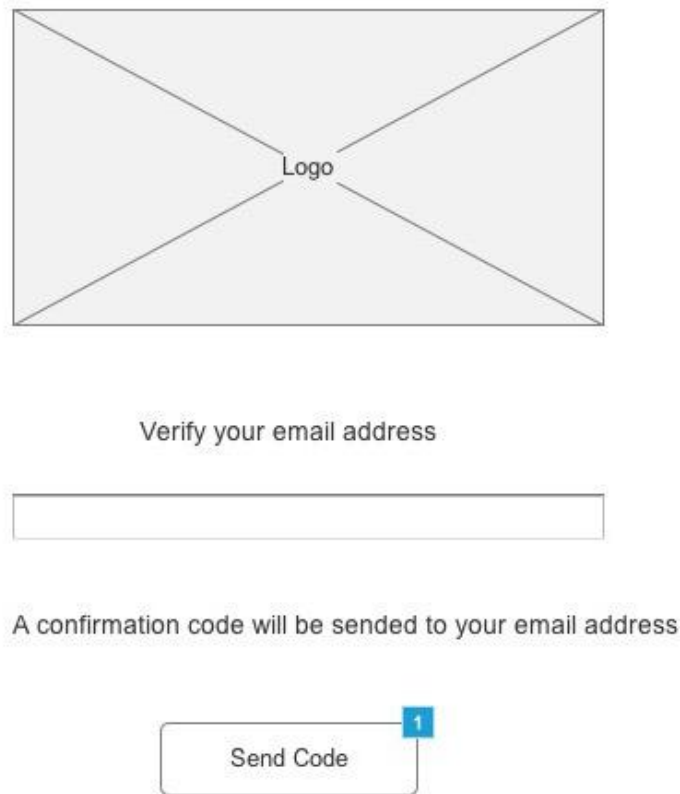
To get the confirmation code, a user has to enter his or her email address correctly and click the Send

Code button.

Figure1-5
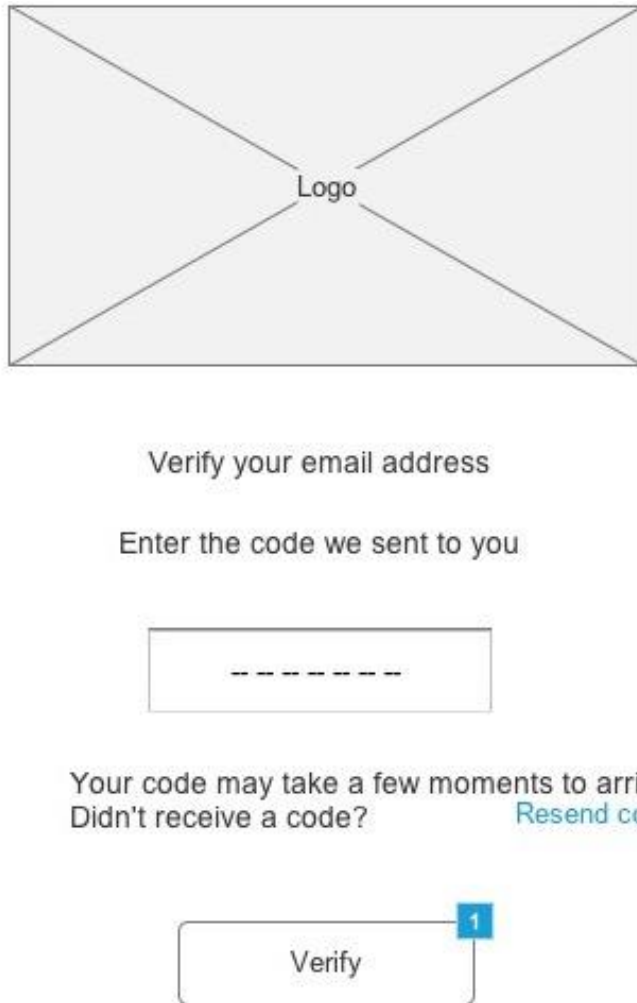
Once a user completes the sign up page, a confirmation code will be sent to his or her email address, which was entered in the box before. When the user enters the code which he or she received into the box and clicks the Verify bottom, a congratulations page will show up to the user to notify that he or she has successfully signed up and became a member of this fantasy sports company.

Figure 2-1

This is the home page. As we can see, it is self-explanatory. There is a setting button at the top left

corner and a chat function located at the top right corner. Under the Fantasy Sports logo, there is a brief

account information of username, portrait, and balance.

Beneath the demarcation line, there are several boxes. As a user, he or she can select one sport at a time

and each type of sport will lead the user to another unique sport type page.

Figure 2-2

When a user clicks the client logo in figure 2-1, another page will replace the previous page. Total points earned by the user and the account balance are shown. In addition, this page allows users to add funds and withdraw funds. History can be viewed here as well. Information and support are provided in this section too.

Figure 3-1
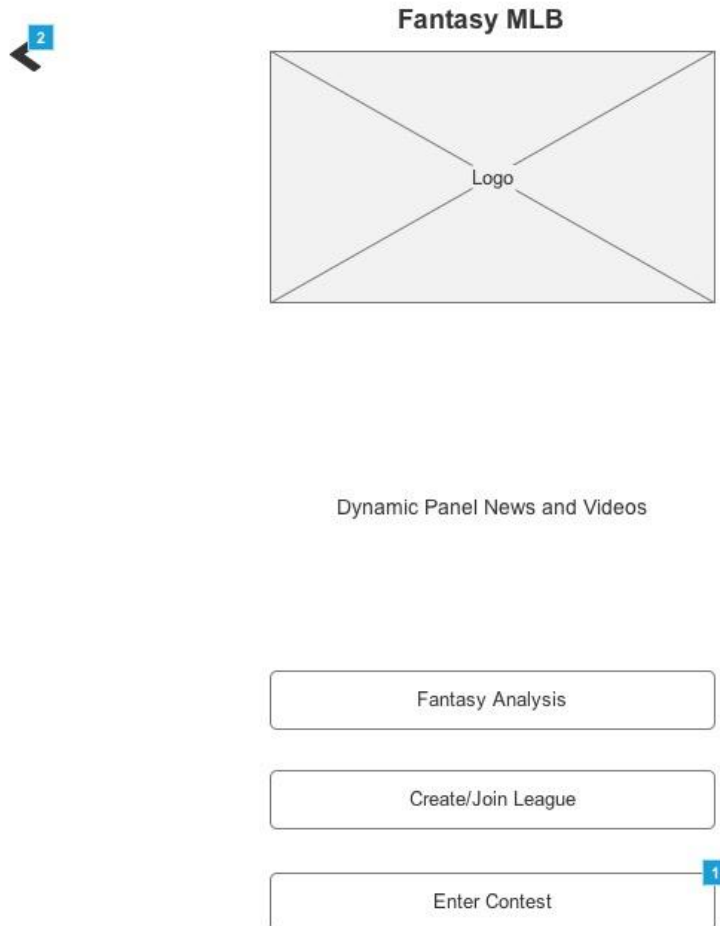
This page is about the MLB sport. As a user, he or she will have access to view the current MLB analysis. In addition, he or she can create his or her own league and set up play rules or join other leagues, which already exist. Then the user can enter the contest to play fantasy MLB.

Figure 3-2

When a user enters the contest, he or she will see a list of tournaments. Information of those tournaments

is listed in each box. It is clear to get the details of each tournament. Additionally, a user could create a

simulative contest or a private contest to compete with friends by clicking the Create Contest button.

Figure 3-3

MLB $4K Tournament [$400 to 1st]

| $5 | $4,000 | 323/500 |
| Entry Fee | Prizes | Entries |

Prize payouts

Rank	Prize
1st	$400
2nd	$200
3rd	$150
4th	$100
5th	$75
6th-10th	$60
11th-15th	$50
16th-20th	$40
21th-30th	$30
31th-40th	$20
41th-50th	$17
51th-75th	$15
Enter Contest	

When a user enters a specific tournament, the first page that shows up is the payout page. A user would have a clear knowledge about what bonus he or she can gain in different ranks.

Figure 3-4

This is the last step to play fantasy MLB; the user needs to set his or her lineup. The user can add

players by clicking the plus symbol at the right of this page, and then a list of certain types of players

such as a list of pitchers will show up to choose from. Once a user completes the selection, he or she can

either save the entry for next time to modify or simply submit the lineup to join the game.

As the MLB Fantasy example showed above, other sports such as NBA, NHL, NFL and Horseracing share a similar game pattern as Fantasy MLB. When users submit their draft, which is the lineup, the final points are calculated according to the performance of each player individually after their MLB games. Then the sum of total points added from each player will determine the rank of the fantasy sports customer.

In addition, this fantasy sport application allows users to create leagues and ask friends to join and compete with each other as well, which enhances the interaction between friends and family.

Operation of Fantasy Sports

Fantasy sports games are very popular in the United States, which has become public leisure sports games of Americans (Isidore, 2015). Fantasy sports games have involved different sports leagues such as NBA, NFL, MLB and even Horseracing, etc. As a fantasy NBA player, he or she can create a fantasy sports team by selecting different players to form a simulative team. These selected players are real players from sports leagues such as NBA, and MLB, etc (Isidore, 2015). For example, a fantasy sports player could choose LeBron James from Cleveland Cavaliers to be the SF in his or her team, Stephen Curry from Golden States Warriors to be the PG, Klay Thompson from Golden States Warriors to be the SG, and Pau Gasol from Chicago Bulls to be the PF. The fantasy sports player determines these selections; the user could analyze each player's personal performance and data from previous matches and infer those players' future performance in order to pick ideal players to form a simulative team. In addition, they can pick their favorite players regardless of their performance. It is all about fantasy players' own choice. Then a fantasy sports player could create a league and ask friends to join the league

and compete with other leagues. He or she can also join other leagues, which already exist. When they win a competition, they win some rewards as well.

The total points of each league, which are added from the individual team, determine the winning. The points are calculated according to each players' real game data. For an example of NFL fantasy rules, each player's touchdown could be regarded as 6 points; a fumble recovery is 2 points and a tackle is 1 point. If the NFL player who was selected by a NFL fantasy player has one touchdown, two fumble recoveries and ten tackles during a game, then this player's total points are as follows:

$$6*1 + 2*2 + 1*10 = 20$$

A team's total points are the sum of each player's points. The league's final points are added from each individual team of each Fantasy Sports player. Before fantasy players begin to play the fantasy sports, the fantasy sports company collects a certain number of funds, and then the winner could earn rewards, which are offered by the Fantasy sports company. During the game, fantasy sports players can sign, dismiss or trade players. It is like a simulative soccer manager game; the difference is that it cost fantasy sports players' real money. The winning is determined by the total performance of players in the fantasy simulative team, which is selected, by the fantasy sports player. Although a player's performance could be concluded from his previous games, the state of the player in the next specific real game is not determined and it depends on luck at some degree. Uncertainty is also the reason why Fantasy Sports are popular at present.

According to the Unlawful Internet Gambling Enforcement Act, all money wagering online based on luck are regards as illegal gambling. But after the lobbying of several interest groups of Fantasy Sports, the United States Congress defined Fantasy Sports as a game of skill (Isidore, 2015).

Fantasy Sports is so popular that even Yahoo has stepped into this grey area to share the "cake". Some popular applications of Fantasy Sports are FanDuel, DraftKings, and Yahoo Fantasy, etc. Although Fantasy Sports try their best to isolate itself from illegal gambling, the gambling status of itself is undeniable. As fantasy sports are still of extreme interest, the author wants to design a Fantasy Sports game for gambling mecca such as Casinos in Las Vegas, or even the Casinos in Macao to open a Chinese Fantasy Sports market.

Conclusion

Notwithstanding the grey area of Fantasy sports, in terms of its legality, it is still an attractive gaming activity. It is a good leisure activity for friends and families, i.e., it is a good way for parents to guide kids to play Fantasy Sports together in their family time. Due to the reason that the public has regarded gambling as a negative activity through the ages, most emotions born from gambling are negative emotions such as addiction, anger, and aggression, which can lead to crime. Unlike normal illegal sports gambling, Fantasy sports are legalized in most states in the United States due to its way of positioning itself that it is a game of skill rather than a game of gambling. In this case, Fantasy Sports successfully edged itself into legalized gambling in the U.S. such as lotteries, casinos, horseracing, etc.

Large corporations such as the Yahoo Corporation has stepped into this big profit industry to share some profit. It provides job opportunities and boosts American economy. The author noticed a large amount

of market opportunities in Asian countries. This study attempts to design a legalized Fantasy Sports

application for those traditional prosperous gambling industries such as Casinos in Las Vegas or Macau

to support Fantasy Sports and for sports fans to play at their leisure time. Vulnerable people such as kids

should be helped to avoid internet gambling, but it is impossible to build up a perfect system. The

Fantasy Sports designed by the author will have some sections with low entry fees for younger aged

people to develop their Fantasy Sports technique, their information processing skills and inference skills.

In addition, it is a good application of computer science methodology for sports fans to have some fun

while they are watching their favorite sports.

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