CREATION AND ANALYSIS OF PURPOSE DRIVEN ONLINE SOCIAL NETWORKS – APPLICATION TO PARENTS OF GIFTED CHILDREN

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ABSTRACT

Gifted children are the powerful young minds that, if nourished, could one day cure leukemia or stop global warming or become the next Einstein. However these young and brilliant minds need careful nurturing to reach their full potential. Unfortunately this is not the case; American schools spend more than $8 billion a year educating the mentally retarded but spending on the gifted isn't even tabulated in some states. By the most generous calculation, the government spends no more than $800 million on gifted programs. The failure to recognize the need to provide the necessary infrastructure for the gifted is resulting in squandered potential. To bring about change, we believe it is necessary to spread awareness among the parents and to also allow them to connect with each other and have a forum to discuss their issues. To facilitate this we propose to build an online social network for parents of gifted children. We will be also analyzing the network structures of ‘purpose-driven’ online social networks similar to the one we are designing and comparing it with the network structure of a ‘pure’ online social network. This will allow us to check if there is any difference in the two types of network structures and therefore ensure that the applications and search engine used in the online social network for parents of gifted children takes advantage of its network structure and provides better performance.
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Chapter 1

INTRODUCTION

1.1 Statement of the problem

Purpose driven online social networks are becoming popular and increasingly important. For example online social networks like LinkedIn have changed the way people network amongst their peers or look for jobs. In this thesis we address the domain of gifted children to create and analyze such social networks. Information about various aspects of giftedness is not easily available and there is also lack of a forum for discussion of the problems that parents of gifted children face. To address this situation we will be building an online social network for the parents of gifted children. This social network will have all the basic features of an online social network like friend requests, email, blogs, etc and it will also provide an easy access to necessary information like state policies on the gifted, ranking of schools based on some measure for opportunities in gifted education. Besides these features, it will also have a section for professional advice in the form of a panel of experts available to answer any queries. We also plan to develop a special sub-network for the children in the future.

The second part of the problem will involve an analysis of the structure of ‘purpose-driven’ online social networks similar to the one we are building for the parents of gifted
children. We believe that there could be a difference between the structure of this type of network and the structure of a ‘pure’ online social network like Orkut.

1.2 Motivation

Lewis Terman began his famous study of genius in 1921 because he believed that nurturing academically exceptional children was essential for the country's future [13]. Eighty seven years later, gifted students drop out at the same rates as non-gifted kids―about 5% of both populations leave school early [21]. The gifted children are not getting the consideration they need to reach their full potential which suggests that some of the best young minds are being squandered. In addition to this, many gifted and talented children may be misdiagnosed by psychologists, psychiatrists, pediatricians, and other health care professionals. The most common misdiagnoses could be: Attention Deficit Hyperactivity Disorder (ADHD), Oppositional Defiant Disorder (OD), Obsessive Compulsive Disorder (OCD), and Mood Disorders such as Cyclothymic Disorder, Dysthymic Disorder, Depression, and Bi-Polar Disorder [22]. The best way to remedy this situation would be to spread awareness about giftedness and the needs of the gifted.

There are many organizations and programs for the gifted, but the availability of information on these is a huge problem. It takes hours of thorough searching to get the necessary information. Moreover parents are often unaware that their child may be gifted and this could lead to a misdiagnosis. For parents who are aware of their child’s giftedness, the lack of opportunities for the children in school is equally frustrating.
Without the proper guidance parents are at a loss, resulting in further neglect of the gifted children. In this thesis we want to alleviate the problem through the building of an online social network for the parents of gifted children.

The design aspect of the online social network brings us to the second part of our problem – analysis of the structure of ‘purpose-driven’ online social networks. The various search engines and applications based on social networks have all been designed with the assumption that all online social networks have the same structure. However, as we progressed with the design of our social network, we realized that there could be a difference between the ‘purpose-driven’ online social networks like the one we are designing and a ‘pure’ online social network like Orkut. Thus we will be analyzing the structures of some existing ‘purpose-driven’ online social networks and comparing it with the structure of some ‘pure’ online social networks.

1.3 Research Objectives

With the creation of an online social network for the parents of gifted children, we hope to provide an easy access to every kind of information on giftedness for parents or anyone who is interested in the gifted. This will ensure the spread of awareness regarding the gifted children and make a big difference the way the gifted are perceived and also in their upbringing. The forum for discussion will give parents the much needed space to address various issues unique to them. The sub-network for the children will also give the
gifted children an opportunity to meet others like them and prevent them from feeling isolated and different from the rest of the children.

On the other hand, the analysis of the structure of the ‘purpose-driven’ networks will help us to understand the structure of online social networks in greater depth. Through this analysis, we will know whether the assumption of all social networks’ structure being same holds true or not. If there is a difference, then the design of search engines and most of the applications which have been designed to take advantage of the network structure would have to be re-thought. This analysis will be a critical part of our problem, because if there is a difference in the two types of structures then the design of the online social network for parents of gifted children and search engine for our ‘purpose-driven’ online social network would have to be modified.

The two objectives of building the prototype and the other of analyzing the ‘purpose-driven’ online social networks are slightly disjointed objectives. However, the analysis of the networks will result in good design of the prototype, which eventually results in effective traffic and hence enrollment in the online social network. Therefore directly a good design of the online social network for parents of gifted children will help in attracting more participants. In this thesis our intent is to study the feasibility and structure of the design of the online social network for parents of gifted children. Hence we accomplish the two tasks of design and analysis as separate ones.
1.4 Organization of the Thesis

The thesis organization is as follows. Chapter 2 gives an introduction about Gifted Children and a brief overview about the various organizations, gifted programs in schools and government policies regarding gifted education. An introduction to Social Network Analysis is given in Chapter 3, where we will also be discussing the various social networks and the social network analyses being conducted on online social networks in particular. In Chapter 4, we present the details of the development of the Online Social Network for Parents of Gifted Children. The analysis conducted on the structure of the ‘purpose-driven’ online social networks Babajob and OGTOC will be discussed at length in Chapter 5. This will be followed by Chapter 6, which contains the conclusions and directions for future work.
Chapter 2

GIFTED CHILDREN

An introduction to the gifted children will be given in the first section of this chapter followed by brief descriptions of the various resources available to them and the government policies.

2.1 Who are the Gifted Children?

The word ‘Gifted’ takes on different interpretations across various cultures but they all describe children who are highly skilled in many areas or have the potential to do so. Despite this variation in interpretation, there are a few foundational definitions, which are commonly referenced.

- The Javits Act – 1988

_The term gifted and talented student means children and youths who give evidence of higher performance capability in such areas as intellectual, creative, artistic, or leadership capacity, or in specific academic fields, and who require services or activities not ordinarily provided by the schools in order to develop such capabilities fully._


_Gifted and talented children are those identified by professionally qualified persons who by virtue of outstanding abilities are capable of high performance. These are children who require differentiated educational programs and/or services beyond those normally provided by_
the regular school program in order to realize their contribution to self and society

2.2 Resources available for the Gifted

The gifted child has a much higher IQ than the average child and hence needs a more challenging learning environment to reach his or her full potential. The gifted child also exhibits different characteristics like high sensitivity; excessive amounts of energy, etc. Therefore it is very important for the parents of the gifted child to be capable of dealing with them. A number of parents may not have the knowledge or experience to deal with a gifted child and would need guidance to do so. There are several organizations in the country that provide guidance for such parents. Likewise there are a lot of programs offered by universities and organizations to help provide a challenging learning environment for the gifted children. Besides the privately run organizations, a few of the state governments also fund gifted programs in their schools. Details of the government policy regarding gifted education and a few of the prominent gifted organizations are described in the following sections.

2.2.1 Organizations

The National Association for Gifted Children is one of the largest organizations, which helps train teachers, encourage parents and educate administrators and policymakers on how to develop and support gifted children. They provide a wide variety of information ranging from design of gifted programs in schools to parenting gifted children.
Individuals are allowed to be members of this organization and receive discounts on books, updates on trend in gifted education and subscription of the ‘Gifted Child Quarterly’ or ‘Parenting for High Potential’. The association also hosts annual conventions.

On a different note, The Davidson Institute for Talent Development offers professional consulting to a family to help plan based on the child’s ability. They also run a free public day school for the gifted – ‘The Davidson Academy’, at the University of Nevada, Reno. They have a lot to offer to the gifted and talented children as well, ranging from the young scholar’s online community to fellowships for students under 18 in areas like Mathematics, Science, Music, etc. They also host a three week long summer program for the gifted - ‘Think Summer Institute’ – at the University of Nevada, Reno. Like the other organizations, the Davidson Institute offers memberships which come with free services like consultation, publication for members and access to their online community.

Unlike the other organizations, membership to the Association for the Gifted is limited to members of the Council for Exceptional Children (CEC) - The Association for the Gifted, is the official division of the CEC. This organization provides information on preschools, visiting schools etc. for the gifted and also allows members to post queries which are answered by the head of the parent committee.

Other organizations like the National Foundation for Gifted and Creative Children focus more on bringing awareness about the gifted to parents. Most of the parents are unaware
that their children could be gifted and many such children are being falsely labeled with Attention Deficit Disorder (ADD) or Attention Deficit Hyperactivity Disorder (ADHD). By spreading awareness about the gifted, they hope to prevent false diagnosis of ADD or ADHD and help the children reach their true potential.

An effort to provide a networking and information medium for the parents of the gifted children has been undertaken by sites like Hoagies Gifted Education Page and Gifted-Children.com. They have tried to create a network through mailing lists and online conference communities. In addition to the mailing lists, these sites provide lists of recommended reading on various aspects of giftedness, information on the latest research, newsletters, school guides, etc.

2.2.2 Universities

A number of universities have special programs for the gifted children. One of the most prominent among these is the ‘Center for Talented Youth’ (CTY) at John Hopkins. They offer distance learning courses, summer programs for different grades, family programs and international programs in China, Spain and Mexico. Children qualify for these programs through international and domestic talent searches. The children at CTY have access to the site Cogito.org which allows them to discuss their ideas, write and publish research. CTY also has the Diagnostic and Counseling Center to help families and educators develop education plans for students on the basis of their demonstrated abilities, knowledge and interests. Financial help is provided for the students by CTY.
through the Next Generation Venture Fund and the Jack Kent Cooke Foundation Young Scholars Program.

Another notable program is the Neag Center for Gifted Education and Talent Development at the University of Connecticut. They have a National Research Center on the Gifted and Talented (NRC/GT) where the research team focuses on studies related to creativity, assessment, identification, programming, and evaluation of gifted children. High school juniors and seniors are selected to participate in ongoing research projects and they also offer a graduate program for students interested in teaching gifted children. The Neag Center has many initiatives like the Renzulli Learning System, which is an online program that matches the students’ interests and learning styles and suggests “enrichment activities” that could help the student improve his skills. Every summer the center hosts ‘Confratute’ (conference + institute) – the professional development program on enrichment learning and teaching, which attracts participants from around the world.

Rick’s Center located in the University of Denver, is a school for gifted children up to the eighth grade. Rick’s center also has the Institute for Development of Gifted Education where research focuses on cognitive and social/emotional development of gifted children. The institute offers outreach programs for the support of gifted education, professional development programs for teachers, administrators and gifted education specialists. They also assist in the design, development, field-testing, and publishing of curriculum materials.
There is an ongoing research project at Stanford University dedicated to developing computer-based multimedia courses in Mathematics, Physics, English, Computer Programming and other subjects for students of high ability. Stanford offers these courses through the Educated Program for Gifted Youth (EPGY) online high school. To qualify for the courses students have to submit their SAT scores. The advanced level course credits can be used towards the bachelors’ degree.

Duke University is the home of the American Association for Gifted Children, one of the oldest advocacy organizations for gifted children. The association focuses more on preschool and elementary students. They publish considerable material for the educational research community, for people in the medical profession, and for parents and teachers of gifted children.

Besides these universities, there are a few more which offer summer programs for the gifted like the Northwestern University, West Chester University of Pennsylvania, UCLA, Princeton and Vassar College. Given below are a list of some of the prominent gifted organizations and programs in the universities mentioned earlier.

<table>
<thead>
<tr>
<th>ORGANIZATIONS / PROGRAMS</th>
<th>LINKS</th>
</tr>
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<tbody>
<tr>
<td>National Association for Gifted Children</td>
<td><a href="http://www.nagc.org/">http://www.nagc.org/</a></td>
</tr>
<tr>
<td>Organization</td>
<td>Website Link</td>
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<tr>
<td>------------------------------------------------------------------------------</td>
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<tr>
<td>Davidson Institute for Talent Development</td>
<td><a href="http://www.davidsongifted.org/">http://www.davidsongifted.org/</a></td>
</tr>
<tr>
<td>CEC Association for the Gifted</td>
<td><a href="http://www.cectag.org/">http://www.cectag.org/</a></td>
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<tr>
<td>National Foundation for Gifted and Creative Children</td>
<td><a href="http://www.nfgcc.org/">http://www.nfgcc.org/</a></td>
</tr>
<tr>
<td>Hoagies Gifted Education Page</td>
<td><a href="http://www.hoagiesgifted.org/">http://www.hoagiesgifted.org/</a></td>
</tr>
<tr>
<td>Center for Talented Youth’ (CTY) at John Hopkins</td>
<td><a href="http://cty.jhu.edu/">http://cty.jhu.edu/</a></td>
</tr>
<tr>
<td>National Research Center on the Gifted and Talented (NRC/GT)</td>
<td><a href="http://www.gifted.uconn.edu/NRCGT.html">http://www.gifted.uconn.edu/NRCGT.html</a></td>
</tr>
<tr>
<td>University of Denver - Rick’s Center</td>
<td><a href="http://www.du.edu/ricks/">http://www.du.edu/ricks/</a></td>
</tr>
<tr>
<td>Stanford University’s Educated Program for Gifted Youth (EPGY)</td>
<td><a href="http://epgy.stanford.edu/">http://epgy.stanford.edu/</a></td>
</tr>
<tr>
<td>Northwestern University – Center for Talent Development</td>
<td><a href="http://www.ctd.northwestern.edu/">http://www.ctd.northwestern.edu/</a></td>
</tr>
<tr>
<td>West Chester University of Pennsylvania – Summer Academy for Gifted Children</td>
<td><a href="http://www.wcupa.edu/giftedsummeracademy/">http://www.wcupa.edu/giftedsummeracademy/</a></td>
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<tr>
<td>Vassar College - Summer Institute for the Gifted</td>
<td><a href="http://www.giftedstudy.com/residential/vassar/index.asp">http://www.giftedstudy.com/residential/vassar/index.asp</a></td>
</tr>
</tbody>
</table>

**Table 1:** List of gifted organizations and programs

### 2.2.3 Government Policies

The Federal Government does not provide any funds directly for programs and services for the gifted and talented children. However they do allocate funds to the ‘Jacob K. Javits Gifted and Talented Students Education Act’, which funds the National Research Center for the Gifted and Talented located at the University of Connecticut.

Almost all decisions about gifted education are made at the state and local level. State laws, local policies, and available funding vary widely, resulting in disparity of services between school districts. States like Kansas, Oklahoma, Arizona, Iowa and a few more, fully fund gifted programs in their schools. While some like Ohio, Virginia, Utah, Alabama partially fund the gifted programs. Gifted programming is mandated but not
funded in some states like Pennsylvania, New Jersey, Oregon and Maryland. On the other hand states like Wyoming, California, Illinois, and Connecticut allocate funds to gifted programs even though it is not mandated in these states. Some states like New York, Vermont, Missouri, and New Hampshire have neither a mandate nor funds for gifted programs. Gifted children in such states can only continue in communities that can provide the services without state or federal help.

As we can see, there are quite a few resources available to the parents. However, getting information about these resources is where the difficulty lies. In addition to this, there is lack of a forum for parents to discuss issues pertaining to gifted issues. We will be addressing these problems in the following chapters.
Chapter 3

SOCIAL NETWORK ANALYSIS

In this chapter the first section gives a brief introduction about Social Networks. Online Social Networks have been discussed in greater detail in the next section followed by an overview of the different types of Social Network Analysis being conducted on online social networks.

3.1 What is a Social Network?

The term ‘Social Network’ has evolved since it was first coined by Professor J.A. Barnes in 1954. Today we associate social networks with not just people, but any entity that has a relationship with another entity. Entities could be organizations, countries, websites, etc having relationships such as trade agreements, business deals, and hyperlinks and so on. As the realm of social networks has grown, so has the type of analysis associated with it and the fields of application of such analyses. A few of these are the study of spread of disease using the evolution of social networks and study of topology and vulnerability of the London underground system [1]. At the heart of social network analysis lays the study of social relations (links) between entities. Different interpretations of these relations have yielded answers to many social, behavioral and technical questions. Some of the common metrics used to study these relations are centrality, clustering coefficient, average distance and degree distribution.
One of the areas where social networking has seen unprecedented growth is the Web. As we observe the growing adoption of online social networks by individuals to stay in touch with friends, network amongst colleagues, look for jobs, we can only say that online social networking will become a ubiquitous feature of online life. This concept of online social networking and the various types of analysis that is being done on these networks is further explained in the following sections.

3.2 Online Social Networks

Online social networks have been around since the beginning of the internet. For example, the graph formed by email users who exchange messages with each other forms an online social network [3]. However dedicated online social networking sites as we know them today have been introduced and gained popularity in the recent years.

The online social networking sites like Facebook, Orkut, Flickr, Babajob, OGTOC, etc. are usually run by individual corporations and are accessible via the Web. Some of these sites like Facebook and Orkut are used purely for social networking where the primary purpose of the site is to allow users to find and connect to other users. On the other hand there are a few other social networking sites which serve a specific purpose – post or look for jobs, etc. For instance social networking sites Babajob and LinkedIn are primarily used to look for / post jobs and professional networking, respectively. Members of these sites join the online social network to serve a purpose and not just to network with friends.
To participate in these social networking sites, a user has to register with the site and become a member. As a member, users can invite their friends to join, or become friends with existing members. Some sites like Flickr allow users to connect to other users without other users’ consent while others like Orkut, Facebook allow such links only if both users consent. To put it very simply, an online social network is a network of users and links between the users.

3.3 Analyses on Online Social Networks

In the past few years, the emergence of many online social networking sites has been a force to reckon with. Facebook, MySpace, Orkut are a few of the popular ones with millions of members and reportedly 230,000 new registrations per day. A trend like this has far reaching effects on society and technology and this has given rise to analysis of such networks from different perspectives. To study these networks, researchers have used methods like network ethnography[4], web crawling[3][5] and virtual ethnography[7] to collect data.

Most of the analysis on online social networks has been done in the recent years and varies over a breadth of subjects. The various areas studied vary from the structure of online social networks [3] to the impact of online social networks on the lives of people. Teenagers had been thought to constitute majority of the users of these social networking sites, however it has been seen that the site MySpace thought to have mostly teenage members[6] has a user base with a median age of 21[5] and contrary to previous
assumptions, MySpace has more female than male users[5]. There also seems to be a significant association between age and gender of members as seen below.

Figure 1: Ages and genders of MySpace users [5]

Sociological impact of online social networks on the youth has been studied using methods like the theoretical framework: of Mediated Discourse Analysis (MDA) which focuses more on social actions rather than just written text or language. The MDA framework originates from the Nexus Analysis which was carried out to study the Danish online social network Arto [7]. The Nexus Analysis involves an analysis of the nexus of practice by going through the three phases: engaging, navigating and changing.
Through this study, they have tried to find the various kinds of relationships sought after on the social networking site, the types of applications members use to portray themselves and how members consider the site to be an extension of their lives. They believe that the online social network Arto has provided an alternate space for the young people to form friendships and have their own identity. The identities created by the members seem to have an element of self-construction and a high degree of co-construction by their friends. The youngsters also appear to use the social network to maintain their real life friendships and in a way the network acts as a forum for reassurance and affirmative messages between them. The social network seems to be an extension of their real lives.
Another model that was used to study the impact of online social networks on the lives of young teenagers was the Stine Gotveds model of ‘cyber social reality’ [4]. This model is a modification of the ‘triangle of social reality’ with the additional fact that online communication plays a big role in the current social reality.

![Figure 3: Triangle of Cyber Social Reality [4]](image)

The mediated social network was integrated with the cyber social reality as shown in figure 5. This was done to understand how online communities mediate social networks of teenagers.

![Figure 4: Integration of Mediated Social Networks with Cyber Social Reality [4]](image)
This study concludes that the online communities are an alleged part of the teenagers’ lives and they also believe that these communities provide a sense of belonging or identification.

As mentioned earlier, the construction of identities of the users in these sites is heavily dependent on their friendships and these sites seem to act as a forum for re-assurance and help the members feel a part of the society [7]. The users in their bid to reach out to others tend to disclose and share a lot of personal information. This information has been known to be used by firms for marketing purposes and by university administrations for disciplinary actions [9]. Such invasion of privacy could have serious implications and there has been an analysis of the security issues in sites like Facebook. The Facebook system has been analyzed in terms of Fair information practices as recommended by the Federal Trade Commission [9]. From a survey conducted for this study, 91% of the respondents had not read the terms of service and 89% had never read the privacy policy. So very few of the users know that their data can be shared with other companies, etc. A threat model was used to analyze specific privacy risks and for each threat, they analyze the efficacy of the current protection, and where solutions are inadequate, they make recommendations on how to address the issue [9].

The other aspect that has been analyzed is the design of online social networks, for which signaling theory has been used as a framework for analysis [8]. Signaling theory is very well suited for analyzing the small-scale features of online social networks because each action can be broken down into measurable costs and benefits. In this case, the agents are
the users of the service. The cost of using a feature can be calculated by estimating the number of clicks needed to finish a task, or the time required to complete a process [8].

The problems in the design of an online social network arise mainly due to difference in incentives of the user (self expression) and the builder (profit, attracting advertisers, investors, members). Members use connections to shape their online identity while builders use them as tools to promote their interests to a larger audience and half the reasons members make connections is due to the incentives put in place by the builders. The imbalance in the cost structure due to the design problems leads to many interface problems. A solution to this could be an activity based interface, where traditional links between users are replaced by activity based links [8]. This would lead users to more meaningful explorations.

Besides looking at the design of the network, as mentioned above, the structure of a network could also play an important role in creating better and faster applications for these networks. There have been studies to compare the structure of the online social networks with the web and it has been concluded that the social networks exhibit power law and small world properties with small average path lengths [3]. The social networking sites seem to have a large number of small tightly clustered local user communities held together by nodes of high degree [3]. So far all online social network structures have been thought of to be the same. However there could be a distinct difference between online social networks like Orkut - which is purely for social
networking, as opposed to social networks like Babajob - which serves a specific purpose like posting or looking for jobs. This will be discussed further in the next few chapters.
Chapter 4

ONLINE SOCIAL NETWORK FOR PARENTS OF GIFTED CHILDREN

As discussed in Chapter 2, the role of a parent is very important in helping a gifted child reach his/her full potential. Therefore it becomes absolutely necessary to ensure that the parents are capable of dealing with their gifted child. However, as we all know, this is not always the case. There are a number of organizations which do provide help for such parents, but by and large they are not able to cater to all their needs. The parents of gifted children face a unique dilemma – concern that their child is not challenged satisfactorily in the classrooms. This is unique because majority of parents, having to worry about their child not performing well enough, cannot identify with such a problem. In addition to this, the implementation of state policies for gifted children leaves much to be desired for, resulting in frustration and helplessness amongst the parents. There is lack of a forum where the parents of gifted children can voice their concerns and address their grievances and in the end, it is the children who suffer. The creation of an online social network for Parents of Gifted Children is an attempt to fill this void.

In the next few sections, the process of building an online social network will be discussed, followed by the requirements of the online social network for Parents of Gifted Children. The final section will address the design and implementation details.
4.1 Building an Online Social Network

With millions of dollars being spent by organizations like News Corp., to buy online social networking site MySpace, it is only evident that there would be growing interest in building them. Besides the dream of millions, the inexpensive and relative ease of networking, that online social networks offer global businesses, has attracted a fair amount of attention in the creation of such networks. Companies have been known to use online social networks to build and expand their contact base, networking their way to a stronger Web presence, enhanced credibility and more customers. Experts on web marketing even offer tips for promoting a business through online social networks [11]

There are many ways to build a social network, but they can be broadly categorized into two types – building it using one of the various ‘products’ available in the market or building it from first principles.

To elaborate a little further about the ‘products’ available - there are several companies that provide “white label” social networking platforms. The idea of white labeling a network is to make the platform provider as invisible as possible to the social network’s users and to brand the network with the builder’s identity or intent [10]. These white label platforms enable customers to build their own social networks and to tailor these networks to serve a range of purposes. Companies like Ning, PeopleAggregator provide network building tools with which customers can easily select features and design a brand new social network with minimal effort. Such companies do not interact much with
their clients but focus on providing the network building tools which allow the customers to point and click their way to a new network \[10\]. Some other companies like Alstrasoft and Blogtronix provide social networking software for download and installation onto one’s server, also allowing some add-ons as per the client’s requirements. A few of these companies work more closely with their clients and provide complete made-to-order solutions. The services provided by these companies are in high demand, among clients like Reuters, Oracle, HP, Comcast, etc. because they can protect and enhance their clients’ brands by delivering highly-tailored social network components that integrate seamlessly into existing websites \[12\].

As seen above, there are a wide variety of options available to build a network, but they do not come without limitations. All social networks built using the network building tools provided by companies like Ning, share the same user base, allowing a user to join any network hosted by Ning. This prevents the owner of a network (built using network building tools) from completely branding his community \[10\], which may not be an attractive option. In addition to this, social network data ownership could be an issue for some. A few of the companies mentioned above, do provide greater ownership of social network data and/or software. These companies are usually the ones who provide complete made-to-order solutions and cater to big corporations like Wells Fargo, Ernst & Young, etc. who needs to know that their data is safe and traceable for both dependability and legal reasons \[12\].
On the other hand, we have the option of building a social network from first principles which may seem like a daunting task, but with the proper resources, should not be impossible to achieve. A few guidelines to help a person get an idea about what is involved in designing and creating a social network will be explained below.

The first thing to be considered when building a social network is the subscriber base. It is important to have an idea about the subscriber base because a lot of the implementation details will be dependent on the size of the subscriber base and the design would depend on their needs. We would then need to select a suitable platform like Windows, Linux, etc. for the development of the social network, along with which we also have to decide what framework, programming language and database would be best suited for the purpose. When these choices are being made, it is necessary to keep in mind the scalability of each, because the network will continuously evolve. It is also important to design the network by taking into account the requirements and competence of the user base since we would not want to alienate the users with something they cannot relate to or use easily. Once the social network is ready, any web-server like Apache, Tomcat, Windows IIS can be selected to host the network.

As mentioned earlier, the guidelines discussed above will help someone get a basic idea of what is involved in building an online social network. The actual implementation will differ vastly from one network to another and would require careful planning, designing and programming to be finally ready.
4.2 Software Development Process Model for the Online Social Network

As mentioned above, the different phases involved in the design and implementation of an online social network should be represented using a software development process model. This ensures a time and cost effective implementation of the system. For the development of the online social network for parents of gifted children, we have decided to use the Waterfall Model. A brief description of this model will be followed by the detailed waterfall model for the online social network for parents of gifted children.

The Waterfall Model was originally developed by Royce [21] but many changes have been applied to it over time. This model consists of different phases which are processed in a linear fashion. Each phase has to be complete before the next one can begin. The waterfall model is widely used and is one of the easily manageable process models. This type of process model is best suited for projects where the requirements can be gathered at the beginning.
In the following sections, each of the phases of the waterfall model seen above in Figure 5, will be described with respect to the development of the online social network for parents of gifted children.
4.2.1 Requirement Gathering and Analysis

As mentioned earlier, it is very important to understand the needs of the subscriber base before the design phase of the network. To get a better idea about the requirements, we conducted an interview with the parent of a gifted child. For privacy reasons, we shall name the parent – Parent X. Parent X who is highly educated, has conducted a considerable amount of research on giftedness on her own, has interacted with several other parents of gifted children and is a strong representative of the views of many gifted children’s parents. During the course of the interview, Parent X reconfirmed that it takes an immense amount of effort and diligent searching to locate the required information online. There are many organizations and programs for the gifted but information about them is not easily available. Parent X has also been quite frustrated with the current state of gifted education in the area she resides in and expressed a desire to discuss these issues with other parents. Parent X believes that having these discussions would help solve some of the problems. Further details of the interview can be found in Appendix I.

After meeting with Parent X, we were reassured that the online social network would indeed be a great help to parents of gifted children. The motivation behind creating this online social network for parents of gifted children is to provide a much needed forum for discussion. However, taking into account the lack of organization of information available online, this social network will also provide an easy access to necessary information like state policies on the gifted, ranking of schools based on some measure for opportunities in gifted education. Besides having the basic features of a social
network, we would have a section for professional advice in the form of a panel of
experts available to answer any queries. An advanced search engine and a sub-network
for children will make this social network a one stop shop for the needs of parents of
gifted children.

4.2.2 System Design

There are approximately 3 million academically gifted children in grades K-12 in the U.S
- approximately 4% of the student population of 73.9 million under the age of 17 [26]
[13]. So we would essentially be looking at a user base of a few millions. The design and
implementation of the online social network will take this size into account along with
the requirements discussed above. A prototype of the social network with basic features
will be implemented initially.

The online social networking site will have all the features of a networking site along
with some additional features specific to the network. These basic features are given
below in Table 1.

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Register / Login</td>
<td>New members can register and existing members can log in.</td>
</tr>
<tr>
<td>User profile creation</td>
<td>Members can create their user profiles and enter / edit any information like music, movies, schools, etc on their profiles.</td>
</tr>
</tbody>
</table>
Members can upload images on their profile

Members can edit their password and email

Members can send friend requests to others and accept requests from others. Friends can also be deleted.

Emails can be sent to and received from other members.

Members can create blogs

Search can be used to find any member based on a variety of criteria

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussion Forums</td>
<td>State wise discussion forums will be available for members to participate in</td>
</tr>
<tr>
<td>Information Section</td>
<td>Links to important gifted education sites, programs, etc. will be available. These will be arranged area wise and subject wise.</td>
</tr>
<tr>
<td>Government Policies</td>
<td>Information on the state policies and current developments will be available in this section</td>
</tr>
<tr>
<td>School Ranking</td>
<td>Ranking of schools based on some measures for opportunities in gifted education E.g. Gifted Individualized Education Program (GIEP).</td>
</tr>
<tr>
<td>----------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Message Board</td>
<td>Members can post announcements regarding events, etc. here. This will be visible to all members</td>
</tr>
<tr>
<td>Send / Receive emails</td>
<td>Emails can be sent to and received from other members.</td>
</tr>
<tr>
<td>Queries</td>
<td>Members can post queries in this section. These queries will be answered by a panel of experts.</td>
</tr>
<tr>
<td>FAQ</td>
<td>Frequently asked questions will be available in this section, arranged subject wise.</td>
</tr>
<tr>
<td>Online Shop</td>
<td>This section will have listing of vendors and sites which sell books, etc. related to gifted education.</td>
</tr>
</tbody>
</table>

**Table 3:** Advanced features of the online social network

In the future we also plan to include a sub-network for gifted children upto 6th grade within this online social network for parents of gifted children. We believe this would allow the younger gifted children to connect with others like them and make them feel less isolated and different from the other children. This sub network will also allow them to voice their opinions and have discussions on subjects they care about. Due to their young age, activities that they take part in should be monitored by their parents and having a sub-network would allow that to be done without invading their privacy. This sub-network would be designed to emulate a virtual world, where children can create
their own virtual identities and also contribute to it. We hope to achieve this with some features like those given in Table 4:

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual Identity</td>
<td>Members can create their virtual identities.</td>
</tr>
<tr>
<td>Groups</td>
<td>Members can create groups and invite others to join. They can also join existing groups.</td>
</tr>
<tr>
<td>Discussion Forums</td>
<td>Members can join any discussion forum and participate in it.</td>
</tr>
<tr>
<td>Petition</td>
<td>Members can create a petition for a cause they believe in and ask others to sign up for it. Members can sign up for a petition someone has created.</td>
</tr>
<tr>
<td>Product Design</td>
<td>Members can design any product virtually and have it displayed in the network.</td>
</tr>
<tr>
<td>Games</td>
<td>Members can play online games and also design games, and send them to the network administrator for evaluation. If a game is good, then it can be added to the list of games in the network.</td>
</tr>
</tbody>
</table>

**Table 4:** A few features of the sub-network for Gifted Children

A prototype of the online social network for parents of gifted children will be implemented initially for testing purposes. This prototype will have some of the features
that have been described above. The remaining features will be added to the network eventually.

4.2.3 Implementation

For the implementation of the online social network for Parents of Gifted Children, we chose to develop the entire system rather than using the products available online. Details of the implementation are given in the table below:

<table>
<thead>
<tr>
<th>IMPLEMENTATION DETAILS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Platform</td>
<td>Windows</td>
</tr>
<tr>
<td>Web Application Framework</td>
<td>Ruby on Rails (Rails 2.0.2)</td>
</tr>
<tr>
<td>Languages</td>
<td>Ruby, CSS, html</td>
</tr>
<tr>
<td>Database</td>
<td>MySQL 5.0</td>
</tr>
</tbody>
</table>

Table 5: Implementation details of the network

The prototype of the online social network will be designed and implemented using the specifications given in Table 4. The framework and database, Ruby on Rails and MySQL, respectively have been selected since both are highly scalable.

Screen shots of the prototype that was implemented are given in the next few figures.
Figure 6: Home page of the online social network

Figure 7: Search page
Figure 8: Registration page

Figure 9: Login page
Figure 10: User profile
4.2.4 Testing

To test the different units developed during the implementation phase, a separate test database was set up. Different sets of tests were written to check the various features being implemented. A test for a feature, for example - login, will try to imitate all the actions that a user would perform while logging in. Similar test suites were written to test all the features.

4.2.5 Deployment of System

Initially the prototype of the online social network has been deployed on a local machine with the following specifications: Intel Pentium 3.40 GHz, 2.00 GB RAM. All the basic features of the network have been tested and the system appears to be stable. The additional features will be added to this network and the complete network will then be deployed on a web server. Machine specs.

4.2.6 Maintenance

For the maintenance phase of the network, once the complete network has been deployed there will be regular upgrades of search engines, fine tuning of certain features and implementation of new features. This is an ongoing process which will continue throughout the life cycle of the software, in this case the life of the online social network.
Chapter 5

ANALYSIS OF PURPOSE-DRIVEN SOCIAL NETWORKS

Analysis of online social networks varies widely, ranging from sociological studies to structural studies. This was clearly seen in the discussion on different types of analysis on Online Social Networks in Chapter 3. There has been a considerable focus on studying the sociological impact of online social networks on youth [6][7][5]. On the other hand, studies on the structure and design of online social networks have gained momentum recently. There have been a few studies related to the structure of online social networking sites like Orkut, Flickr, Yahoo! 360, etc. These studies confirm that these networks exhibit the small-world, power-law and scale-free properties [3]. Based on empirical observations, studying the evolution of structure within large online social networks like Yahoo! 360 and Flickr, a simple evolving graph model for social networks has also been designed [14].

It is important to understand the structure of online social networks, because this could lead to new algorithms and better applications, similar to the creation of the algorithm that can detect authoritative sources on a topic that was a result of a study of the structure of World Wide Web [15]. Today Online Social Networks play a huge role in online communication and with its growing adoption; it will become a ubiquitous feature of our online lives. It is likely that social networks will be an integrated part of almost every aspect of the internet. Recent studies have proposed the use of social networks to mitigate
email spam [16], defend against Sybil attacks in which an attacker subverts the reputation system of a peer-to-peer network by creating a large number of pseudonymous entities, using them to gain a disproportionately large influence [17], and improve Internet search[18].

So far the structure of all online social networks has been considered to be similar, but we believe that there could be a difference between the structure of a ‘pure’ online social networking site like Orkut and that of a ‘purpose-driven’ online social network like OGTOC (http://giftedonlineconferences.ning.com/) (Our Gifted Online Conferences) or Babajob (http://www.babajob.com/). By ‘purpose-driven’ networks we mean social networks, where members join with a specific purpose, like looking for or posting jobs (Babajob). If the structures are dissimilar then the entire design of the network and applications would have to be treated differently.

We will make an attempt to study the difference in the structures of these two types of networks – “pure” online social networks and “purpose-driven” online social networks. For this analysis, data has been gathered from two “purpose-driven” social networks. The properties of these two networks will be compared to the properties of the ‘pure’ social networking site Orkut, as presented in the paper by Alan Mislove et al[3]. Details of the analysis are further explained in the following sections.
5.1 Measurement Methodology

In this section, we will give a brief description of the social networks we have considered for the analysis and describe the data collected along with the methodology used to collect it. Since most of the site operators hesitate to provide their network data, we did not get the data directly from them. We have collected the data by accessing the public profiles of the users of the two networks.

5.1.1 Challenges

Online Social Networks in general are very large and highly dynamic and this led to some of the biggest challenges we faced while gathering the data. It becomes very difficult to cover the entire network, and we have to resort to using samples of the network. However, using subsets could result in a biased set of nodes which overestimate some property and underestimate another. This led us to select the method of snowball sampling, since this method has been shown to underestimate the power-law coefficient, but to closely match other metrics, including the overall clustering coefficient [19]. We have also tried to gather data using forward links as well as backward links, but due to the large size and dynamic nature of the network, we could not cover every link.

5.1.2 Method of data collection

For the analysis of ‘purpose-driven’ online social network structures, we chose the social networks OGTOC and Babajob. These social networks were selected because they are
perfect examples of ‘purpose-driven’ online social networks. To collect the data, we visited the public profiles of the users and retrieved the friends list. The retrieved list was then visited and the same process continued till the list was exhausted. A high level statistic of the data collected is given in Table 6 and a brief description about the two online social networks follows subsequently.

<table>
<thead>
<tr>
<th></th>
<th>OGTOC</th>
<th>Babajob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of users</td>
<td>694</td>
<td>2500</td>
</tr>
<tr>
<td>Fraction of user population visited</td>
<td>82.6%</td>
<td>27.8%</td>
</tr>
<tr>
<td>Average number of friends per user</td>
<td>3.9</td>
<td>1.38</td>
</tr>
</tbody>
</table>

**Table 6**: High level statistics of data collected from OGTOC and Babajob

**OGTOC – Our Gifted Online Conferences**

OGTOC is an online social network for people interested in any aspect of the Gifted. We consider this to be a ‘purpose-driven’ network because members of this network are people who are only interested in learning or sharing something about the gifted. Moreover, membership to this online social network requires the approval of the network administrator so this ensures that the members are there for the right purpose.
This social network has been created using one of the ‘white label’ social networking platforms available - the network building tools provided by Ning. This network has most of the features like groups, forum, gadget, etc. common to all networks created in Ning. Members can choose to be a part of a group or create one. Information about the members cannot be accessed without a membership to the network.

The data from OGTOC was collected during May 21 – 31, 2008. The data collected consists of 570 nodes and 2144 links, which is about 82.6% of the user population of this network. The total count of members on a particular day is available in the network, so calculating the fraction was quite simple. Since the fraction of data collected is quite high, the structural properties analyzed can be thought to be representative of the entire network.

**Babajob**

Babajob is a venture in India to combine online social networking with a job site. It can be seen as a social networking site that is primarily used to post and look for jobs. However this is not a regular job site since it caters to the people in the informal working sector – drivers, maids, office helpers and the like. The people in this sector are usually not literate, so their profiles are maintained by a ‘mentor’. This network was created to digitize the referral system of hiring help for the house. They offer cash incentives to the mentors and people who refer someone. As we can see, this is also a perfect example of a
‘purpose-driven’ social network. Information about the members cannot be accessed without a membership in this network.

Data from this network was collected during May 11 – 20, 2008. The data collected consists of 695 nodes and 999 links, which is about 27.8% of the user population. The total number of users of the network was obtained from the Microsoft Solution finder directory [20]. Since we could not get the data from a larger section of the network, the results of the analysis may not be representative of the entire network.

5.2 Analysis of the Network Structures

To analyze the structure of the ‘purposed driven’ online social networks, we will be using the three most robust measures of network topology—degree distribution, average path length and clustering coefficient. A description of these metrics and their respective values for the networks are given below. The structure of the two ‘purpose-driven’ online social networks will be compared with the structure of the ‘pure’ online social networking site Orkut, on the basis of these metrics. The values of the metrics for Orkut have been obtained from the paper by Alan Mislove et al [3].

**Average Path Length**

The average path length of a network is defined as the average number of steps along the shortest paths for all possible pairs of network nodes. A shorter path length in a real
world network like the World Wide Web would indicate efficiency in terms of information transfer. For an unweighted graph, the average path length would be computed as described below:

Starting from a given node and we find the number of its nearest, next-nearest …. \( m^{th} \) neighbors using the following formula: 

\[
z_m = \left| \frac{z_2}{z_1} \right|^{m-1}, \quad \text{where} \quad z_1 \text{ and } z_2 \text{ are the nearest and next nearest neighbors} \ [25].
\]

Now assuming that all nodes in the graph can be reached within \( l \) steps, we have 

\[
1 + \sum_{m=1}^{l} n(m) = N, \quad \text{where} \quad n(m) \text{ is the number of } m^{th} \text{ neighbors of the initial node. To estimate the average path length, we can replace } n(m) \text{ with } z_m, \text{ and the average path length is given by} \ [25]:
\]

\[
l = \frac{\ln(N/z_1)}{\ln(z_2/z_1)} + 1
\]

The average path lengths computed for the ‘purpose-driven’ networks are given in table 7.

<table>
<thead>
<tr>
<th>Network</th>
<th>Average Path Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>OGTOC</td>
<td>2.15130</td>
</tr>
<tr>
<td>Babajob</td>
<td>4.53861</td>
</tr>
<tr>
<td>------------</td>
<td>---------</td>
</tr>
<tr>
<td>Orkut[3]</td>
<td>4.25</td>
</tr>
</tbody>
</table>

**Table 7: Average path lengths of the social networks**

As expected, the average path length of OGTOC is quite small. Since most of the members in this network are related in some way or the other to the Gifted, they would have many common acquaintances, resulting in a short path length.

In case of the average path length in the Babajob network, the value is quite large for such a small subset and there were several unreachable pairs even within this small fraction of the network. This could be due to the fact that we were unable to collect more data or this could also be something specific to this type of ‘purpose-driven’ network. Since this is a network for jobs and the fact that this has a specific design layout for members (mentors) as explained earlier, the structure of this network could vary considerably from the others. This leads to some interesting questions – Do the structures of ‘purpose-driven’ online social networks differ from each other? If so, how significant is this difference and how much can it affect the design principles for applications, search engines, etc for these social networks?

It is possible that when you need a specific skill set, the distance can be very large. In a place like India, the distance between a mentor and a house maid or worker will be in general short, assuming many have house maids. However the distance between the
mentor and driver may be large. Our conjecture is that the nature of the skill may influence the path length and hence average path length.

The 1-sample t-tests confirmed that these path lengths were small as compared to the average path length on a random network. These networks therefore exhibit the small world property. Details of the test can be found in Appendix II.

We find it difficult to comment and draw insights on the difference between the average path lengths of the 'pure' online social network and the 'purpose-driven' online social networks as all the values are fairly small.

**Clustering Coefficient**

The clustering co-efficient of a network indicates how well connected the network is and the closer to 1 the coefficient is the more interconnected the network. The clustering coefficient of a node with ‘N’ neighbors is therefore defined as the number of links that exist between the node’s ‘N’ neighbors, divided by the number of possible links that could exist between the nodes neighbors. The clustering coefficient of a network is calculated in the following manner.

Consider a graph $G = (V,E)$ which consists of a set of vertices $V$ and a set of edges $E$ between them. An edge $e_{ij}$ connects vertex $i$ with vertex $j$. The neighborhood ‘$N$’ for a
vertex $v_i$ is defined as its immediately connected neighbors given as:

$$N_i = \{v_j : e_{ij} \vee e_{ji} \in E\}.$$ 

The degree $k_i$ of a vertex is defined as the number of vertices, $|N_i|$ in its neighborhood ‘$N_i$’ [23].

The clustering coefficient $C_i$ for a vertex $v_i$ is then given by the number of links between the vertices within its neighborhood ‘$N_i$’ divided by the number of links that could possibly exist between them. An undirected graph has the property that $e_{ij}$ and $e_{ji}$ are considered identical. Therefore, if a vertex $v_i$ has $k_i$ neighbors, $\frac{k_i(k_i - 1)}{2}$ edges could exist among the vertices within the neighborhood. [23]

Thus, the **clustering coefficient for undirected graphs** is given by:

$$C_i = \frac{2|\{e_{jk}\}|}{k_i(k_i - 1)} : v_j, v_k \in N_i, e_{jk} \in E.$$ 

The value of the clustering coefficients for the ‘purpose-driven’ networks is given in Table 8.

<table>
<thead>
<tr>
<th>Network</th>
<th>Clustering Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>OGTOC</td>
<td>0.264811</td>
</tr>
<tr>
<td>Babajob</td>
<td>6.38572E-05  \approx 0</td>
</tr>
<tr>
<td>Orkut[3]</td>
<td>0.171</td>
</tr>
</tbody>
</table>

**Table 8**: Clustering Coefficients of the ‘purpose-driven’ networks
The high clustering coefficient that we see in OGTOC suggests strong local clustering and this has a logical explanation – members of this network have a mutual interest, i.e. Gifted Education, so probability that many of them may know the same people is very high.

We can see that the clustering co-efficient of the Babajob network is very low, almost equal to zero. There could be two reasons for this. One reason would be the lack of a larger data sample for this network. However, the logical one seems to be the second one which is explained further. As mentioned earlier the Babajob network has a different layout; the member profiles are managed by a mentor, so the probability of these members being friends with each other is very low. Since these members are all looking for jobs, we could look at these nodes to be competing nodes and friendship among competing nodes is minimal if it exists at all. Thus we would expect the clustering coefficient to be low as computed.

We see a significant difference in the clustering coefficients of the OGTOC network and the Babajob network. The same difference can be seen between the Orkut network and the Babajob network. However, we really cannot compare the OGTOC network and Orkut network because the values of both the clustering coefficients seem to be fairly similar. This brings us back to the same questions we had raised earlier - Do the structures of ‘purpose-driven’ online social networks differ from each other? If so, how significant is this difference and how much can it affect the design principles for applications, search engines, etc for these social networks?
**Degree Distribution**

The degree of a vertex in a network is the number of edges incident on (i.e., connected to) that vertex. The degree distribution is defined as $p(k)$, which is the fraction of vertices in the network that have degree ‘$k$’. Equivalently, $p(k)$ is the probability that a vertex chosen uniformly at random has degree $k$. A plot of $p(k)$ for any given network can be formed by making a histogram of the degrees of vertices. This histogram is the degree distribution for the network. [24]

Degree distributions of various types of networks can be different. For example, the degree distribution of a random graph with a power-law distribution will be given by:

$$p(k) = Ck^{-\gamma}e^{k/\kappa} \quad \text{for } k \geq 1 \quad \text{where } C, \gamma, \text{ and } \kappa \text{ are constants} \ [25].$$

The degree distributions of the ‘purpose-driven’ graphs are given below.
From Figure 11, we can see that the OGTOC network’s degree distribution follows the power-law distribution which can be represented \( P(k) = k^{-\gamma} \) as, where \( \gamma = -1.5993 \). The OGTOC network is therefore a scale-free network.
The degree distribution of the Babajob network seems to follow the power-law distribution, but it would be difficult to confirm this without more data points. Orkut also follows the power law distribution [3].

To summarize the analysis given above, we can say that the two “purpose-driven” social networks seem to have significantly different values of average path length and clustering coefficient. We can see that the OGTOC network exhibits local clustering and shorter average path length indicating that the members have mutual friends. However in the

**Figure 12:** Degree distribution of Babajob network
Babajob network we see a longer average path length with many unreachable pairs and a very low clustering coefficient, almost equivalent to zero. This indicates that members in Babajob do not know or interact with each other. Now if you consider the ‘purpose’ behind these networks – sharing information on Giftedness in OGTOC and job posting / searching in Babajob, we can see that the nature of the nodes in both these networks is very different. In OGTOC nodes want to share their knowledge on Giftedness while in Babajob the nodes are competing against each other for the jobs. This difference in the nature of the nodes is due to the purpose of the network. Hence, we can conclude, that the nature of the nodes dictate the structure of a ‘purpose-driven’ social network.

The difference in structures between the ‘pure’ online social network Orkut and the other two ‘purpose-driven’ networks cannot be ascertained at this point and we would have to analyze the network structures further to get more evidence to support our theory. However, we have been able to ascertain that the ‘purpose-driven’ networks themselves could have different structures which are dependent on the nature of their nodes.
Chapter 6

RESULTS, CONCLUSIONS AND FUTURE WORK

7.1 Summary of Results

To address the lack of easily accessible information and a discussion forum for the parents of gifted children, we have designed an online social network with many features to help them connect with one another. Besides the basic features like profile creation, adding friends, emails, blogs, etc, the online social network will have additional features like discussion forum, information sections, government policies, school ranking, queries, FAQs, etc. as described in Chapter 4. A prototype of this online social network was implemented for testing purposes and the remaining features would be added in future. Depending on the outcome of the analysis of ‘purpose-driven’ online social networks, the online social network for parents of gifted children may have to be redesigned.

As mentioned earlier the online social network for parents of gifted children will be a ‘purpose-driven’ network. To ensure that the design of our social network takes into account the network topology, we analyzed the network structures of two similar ‘purpose-driven’ social networks – OGTOC and Babajob. These network structures were compared with the network structure of a ‘pure’ online social network - Orkut. The comparison was based on the three measures of network topology – degree distribution,
average path length and clustering coefficient. There was a significant difference in the average path length and clustering coefficients of the two ‘purpose-driven’ networks which can be attributed to the varying nature of nodes in the two networks. Both the networks exhibit small world properties. The OGTOC network’s degree distribution follows the power-law with \( \gamma = -1.5993 \) and the degree distribution of the Babajob network, seems to follow the power law distribution. In comparison to the average path length of the Orkut network, the OGTOC network’s average path length is quite small but the average path length of the Babajob network is almost the same. The clustering coefficient of the OGTOC network is a little higher compared to the clustering co-efficient of Orkut. However we see that the Babajob network clustering co-efficient is almost equal to zero.

7.2 Conclusion and Suggestions for Future Work

The difference in structures between the ‘pure’ online social network Orkut and the other two ‘purpose-driven’ networks could not be ascertained with current analysis and we would have to analyze the network structures further to get more evidence to support our theory. However, we have been able to establish that the ‘purpose-driven’ networks themselves could have different structures dependent on the nature of their nodes. This theory is explained further.
Let us consider the ‘purpose’ of the two networks we analyzed to get a better idea about the nature of the nodes in both the networks. The OGTOC online social network is mainly for sharing information on Giftedness and members of this network join the network because they want to interact with other people who have the same interest. On the other hand the Babajob online social network is mainly for posting or looking for jobs. Employees and members join this network because they want to post / look for a job. The members of Babajob will therefore be competing with one another for a job / employee. So, we can see that the nature of the nodes in both these networks is very different. In OGTOC nodes want to share their knowledge on Giftedness while in Babajob the nodes are competing against each other for the jobs.

The ‘purpose’ of the network is clearly reflected in the structure as described further. The OGTOC network exhibits local clustering and shorter average path length indicating that the members have mutual friends. However in the Babajob network we see a longer average path length with many unreachable pairs and a very low clustering coefficient, almost equivalent to zero. This indicates that members in Babajob do not know or interact with each other. This difference in the nature of the nodes is due to the purpose of the network. Hence, we conclude that the nature of the nodes dictate the structure of a ‘purpose-driven’ social network.

Based on this conclusion we can say that the ‘purpose’ behind the online social network for parents of gifted children will be similar to that of the ‘purpose’ behind the OGTOC network. However, since we would need to investigate further to distinguish the
difference between the ‘pure’ online social network Orkut and OGTOC, we cannot say that the current network design is not the best. Therefore we will continue to add the remaining features to the prototype of the online social network for the parents of gifted children.

For future work, we would need to implement of the remaining features for the online social network. After the complete implementation, the online social network can be hosted on a web-server and launched commercially. The other aspect that needs to be looked into in the future would be the analysis of ‘purpose-driven’ networks. We need to get the complete network structure data of more ‘purpose-driven’ online social networks and also look at bigger networks to verify our findings that the structure of a ‘purpose-driven’ online social network depends on the nature of its nodes. In addition to this we need to analyze the structure of ‘purpose-driven’ networks and ‘pure’ online social networks in greater depth by looking at more measures of network topology like centrality, clustering, etc. We may even need to consider a new approach to study these online social network structures to establish our theory that there could be a significant difference in the network structures of ‘pure’ online social networks and ‘purpose-driven’ online social networks.
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Appendix I: INTERVIEW WITH A PARENT OF A GIFTED CHILD

The discussion covered various areas of gifted education ranging from state policies to the varied interests of children. Parent X seemed to believe that there is something fundamentally wrong with the implementation of the state policies for gifted education which results in a lot of frustration and helplessness among the parents of gifted children. There is lack of a forum where they can voice their concerns, as a result of which the children suffer. The gifted children need to be nurtured to reach their full potential – which means offering special programs for them in schools and enriching activities at home, while ensuring that do not feel isolated. Given further are the questions which were in the questionnaire sent before the interview.

1. How difficult is it to find the information you are looking for?

There are a lot of organizations for the gifted but it is very difficult to find the information available online. One has to spend a considerable amount of time looking for information and it isn’t easy at all. You have to know where to look because a search results in so many links that could be of use.

2. Is the information enough?

Like I said earlier, there is a lot of information available but it takes a lot of time to find what you are looking for.
3. What other kinds of information would you like to find online?

I liked what I saw in some of the websites, like the Davidson Institute for Talent Development had the State policies on gifted education of every state. I would also like to have some sort of a ranking for schools based on resources for the gifted or GIEPs, links to other organizations in one area.

4. Would it help if you could get in touch with other parents?

Yes, I think it would because the parents of gifted children have to face very different problems that only other parents of the gifted would understand. Parents also might want to discuss issues at school, lack of opportunities for their kids, implementation of gifted policies, etc. Some parents are also not vocal about their problems for fear of upsetting the teachers, so a place to discuss this would be good.

5. Would you be comfortable joining a social network (like facebook, myspace) and interacting with other parents?

Yes I would be quite comfortable joining a social network and interacting with other parents.

6. What kinds of things would you expect to find in this network? What would be the most useful features for you?

Like I said earlier features like rankings of schools, links to other organizations, state policies, a discussion forum would be some useful features.
7. Would you like professional advice in parenting, choice of school, activities?

Some parents might be interested in getting advice.

8. Would you like your child to be a part of the same network? If not, why?

Yes I would like them to be a part of the network.
Appendix II: 1-SAMPLE T-TEST

A 1-sample t-test was conducted on the average path length for the two ‘purpose-driven’ online social networks – OGTOC and Babajob. The average path length of each of these networks was compared to the average path lengths of 10 random networks having the same number of edges and nodes. The results of the test as shown in minitab are given below.

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One-Sample T: Random Network Average Path Length

Test of mu = 2.1513 vs not = 2.1513

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<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
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Figure 13: 1-sample t-test for OGTOC average path length

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One-Sample T: Random Network Average Path Length

Test of mu = 4.53861 vs not = 4.53861

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Figure 14: 1-sample t-test for Babajob average path length