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ENC 1102-45

7 December 2015

Use of Niche Genre Sets in a Resurrected Discourse Community

Augmented Reality (AR) is a subset of of the computer science field. It is often compared to

Virtual Reality (VR), and rightfully so because the two are extremely similar. In the simplest of

terms, AR is the concept of overlaying or embedding virtual information on top of the real world

with assistance from various perceptual technologies. This is opposed to VR, which overlays virtual

information without regard for the real world. AR would allow a user to create interactive displays

on real world objects, implant virtual objects such as furniture within a user's apartment, or even

create projected navigation tools. VR is limited to stationary simulations and 3D games and lacks a

totaling feeling of emersion.

VR has been around in several forms since the early nineties with the Nintendo Virtual Boy

and VR Vortex System arcade game. Early VR incarnations were limited in technological ability

and failed to hit a mainstream audience. This ultimately lead to the decline in research in the

VR/AR field. With the recent advent of the Oculus Rift, a new series of VR games, 3d modeling

tools, and simulations has emerged. An overall increase in consumer interest for VR and AR

applications has given rise to a new set of research groups dedicated to furthering the current

state-of-the-art. In the past several years, researchers in the AR field have increased in size from a

relatively small handful to many independently operated discourse communities around the globe.

A discourse community, as defined by John Swales, is a group that holds six distinct

characteristics. That means that the community must have a broadly agreed upon set of goals, such

as, an objective or deadline that must be met (Swales 220). It has to have a reliable means of

communication; convening in a central location and talking through online messaging systems are viable means of recouping (Swales 221). It has to utilize at least one standardized form of genre that contributes towards the achievement of the group's ambitions (Swales 221). The community has to use unique speech patterns, or lexis, which are specific to that group; were an outsider to attempt holding a conversation with a member of said discourse community concerning their specialization, the outsider would feel amiss (Swales 222). Lastly, a discourse community must maintain a certain degree of membership with a balance between experts and novices (Swales 222).

Communities of AR researchers exhibit the properties of an established discourse community in their own right. The Interactive Systems and User Experiences Lab (ISUE) at the University of Central Florida serves as a prime example of an - amongst other things - AR focused research cluster. ISUE will be the reference discourse community for the analysis performed within this paper. It will serve as the testing agent onto which comparison is performed, though referred to as a general discourse community amongst the wide range of similar discourse communities located in surrogate academic or private sector institutions.

Since progress is iterative, collaboration between discourse communities of this type is essential. Many groups have similar goals and use similar genres, or text based on action, to achieve said goals within an intertextuality frame of reference (Miller 1). An appropriately high level of abstraction through lexis use is found in genre sets, or "collections of types of texts someone in a particular role is likely to produce" meant for communication between research groups in AR (Bazerman 374). This is understandable, as, generally speaking, no facilitated learning conventions are needed in genres meant for communities pertaining to the same field. AR research groups, as a relatively premature set of discourse communities have a number of commonly agreed upon genre conventions that surely differ from those of established research groups in counterpart technologically heterologous fields. How both AR and other computer science related (non-AR)

research groups differ as conventional discourse communities is of peek interest. The ratio of niche to universal genres conventions within these discourse communities can fluctuate and undoubtedly plays a distinct role in influencing these group's methods of achieving their respective goals. Observing any similarities or differences in genre choice between these groups, along with analyzing any effects that could alter the prioritization of these group's objectives will be the focal point of this piece.

METHODS

Several methods of data aggregation were performed to analyze how genre sets perform work as well as influence goals and internal member structures. All primary sources were taken from ISUE, but can be applied to any generic AR focused research cluster.

I acquired an unassuming email chain that was distributed amongst ISUE members and employees. The contents of the email, along with several similar email chains, were analyzed. Such email chains, originating from ISUE, assist in the understanding of AR discourse community structure and inter-member dynamics, which play important roles in overall goal completion. These particular sources were chosen on the basis that they are directly related to interactions targeted to novices from experts. They act as an example of communication habits that might be found within any discourse community related to computer science. They also contribute in identifying genres which pervade all computer science related research groups; which in turn aids in highlighting those genres which might be truly unique.

Furthermore, I conducted an interview with Associate Professor Joseph J. LaViola who directs ISUE and has been directly and indirectly involved with AR research for the past twenty years. LaViola was asked a variety of questions regarding his start in academics and subject interests; about the history of VR and AR research and how they pertain to Human Computer

Interactions (HCI); and common methods of interaction he uses when dealing with groups outside of the AR discourse community.

Another form of genre analyzed were research papers pertaining to both AR and non-AR related topics. The AR related research paper of scrutiny is *A Framework for the Volumetric Integration of Depth Images*. This paper serves as the most comprehensive piece of literature pertaining to the technical aspects of AR; and while similar papers can be found, this particular source is often regarded as a checkpoint for the current state of AR. While the non-AR related research paper of scrutiny is *A Computationally Efficient Algorithm for Learning Topical Collocation Models*. This paper is related to natural language processing, a subject completely unrelated to AR, and is credited to a prestigious Google research group. It was chosen due to its reverence within the natural language processing research community and flavor of writing style. There is nothing particularly significant about the focus of research chosen for this source; papers with varying topics would have worked just as well.

RESULTS AND DISCUSSION

I performed direct comparisons between AR and non-AR research discourse communities. Several genres were found to pervade both groups, while several other genres were found to have discrete differences between groups. Examples of all noteworthy genres, along with accompanying explanations and analyses on how they affect the AR community's goals and membership structure, are provided in the paragraphs below. Furthermore, the exploration of interactions between similar discourse communities is performed to investigate how that might affects the community's intent when choosing genre systems, primary objectives, and willingness to collaborate.

Shared Genres That Help Achieve Common Goals

Certain genre sets are so practical and useful, that they can be seen in a wide range of discourse communities. Email serves as a popular communication system for any professional

research lab and is by no means exclusive to AR discourse communities. Though it is less versatile than other conventional methods, such as instant messaging systems, it often fills the need for a more formal notification genre. This formal nature can be seen in any generic email chain distributed within ISUE. One particular email, *Ordering Stuff & Future Projects*, describes instructions for a new method of ordering miscellaneous supplies; coupled with a request for an update on future projects from two discourse community members. This email, along with many others like it, was sent from ISUE's upper division class to the lower division class. This use of genre serves a small but effective purpose, keeping everyone informed on an assorted list of issues.

Arguably the most noteworthy genre, utilized across every imaginable field of research, is the research paper. Research papers act as the culmination of months, if not years, worth of work. Though similar in name and purpose, research papers focused on computer science are their own unique genre. Each subset of computer science research has a paper template structure which, through years of continual refinement, is uniquely tailored for accentuating all relevant findings, while maintaining several key similarities.

These similarities within computer science research papers are what make genres, with such distinct layout configurations, behave so similarly. They all tend to be as terse and brief as possible in every facet of the paper's design, with an average of 16% of introductions containing extremely brief CARS Move 3 step a (Shehzad 147). Since the results described within the text should be replicable, deictic references are kept to a minimum (Shehzad 149). Mathematical expressions are often used to reduce space and provide universally accessible descriptions of methodologies. These papers tend to be very "purposive;" expository statements, such as "In this paper", "This work aims", and "Our goal is", tend to be found in most every paper (Shehzad 144). The list continues.

One of the primary goals of every research member revolves around getting a piece of work published within an established pedagogic conference. Several factors contribute to the desire for a

research lab to receive publications. The discourse community's lower division class, i.e. Ph.D

students, need to build their publication history in order to be qualified enough to properly defend

their thesis. The discourse community as a whole benefits from individual publications as well.

Contributing to whichever community a lab is member of, leads to increased notoriety within said

community. This increase in notoriety helps boost the frequency of related labs willingness to

collaborate. It also increases the chance that a potential investor might gain interest in the labs

proceedings and fund extended research.

Unique Genres That Help Influence Dynamic Goals

While AR and non-AR community research papers mostly maintain the same tone and

structure, a deeper analysis exposes several differences in content and intent. Such differences

would be hard to spot if one is unfamiliar with the specific lexis used within two papers related to

each topic respectively.

A Framework for the Volumetric Integration of Depth Images is a research paper related to

the technical side of AR. It explains the current field of AR research and describes how to use the

system that they built. To accomplish its task, this paper aggregates all previous ideas since 2011

(the year AR made its comeback). Besides compiling previously done work into a single space, it

introduces a several novel ideas itself. This paper is often referred to as a checkpoint for modern

day AR research. It is very long and proceeds to get very technical, very quickly.

Prisacariu's introduction begins with a description of several problems in the field, "Storing

the underlying ... (TSDF) volumetrically makes for most of the simplicity and efficiency that can be

achieved .... However, this representation is also memory-intensive ..." (Prisacariu 2). This is

followed by descriptions for how to solve such a problem, a "volumetric representation is split into

a set of blocks aligned with dominant planes" (Prisacariu 2). Within the scope of the introduction, a

novel method for an unsolved technical issue related to AR is introduced.

A Computationally Efficient Algorithm for Learning Topical Collocation Models is a research paper pertaining to natural language processing. It describes an old algorithm which is useful for understanding context information between grouped words in a file. The paper then explains several faults in logic within the old algorithm and partially occupies the niche by proposing a solution to a subproblem faced within said algorithm. Following this is a description of the methodology they use, alongside several technical details.

Zhao's introduction serves as an explanation for previous work, "Previous attempts to use collocations ... in topic models have either relied on a pipeline approach, restricted attention to bigrams, or resulted in models whose inference does not scale to large corpora" (Zhao 1). He then describes his novel method of improving efficiency by "exploiting sparsity and parallelising inference" (Zhao 1). Essentially, this technical terminology describes a fix for the problem by constraining it to something he is actually able to solve.

These two papers fill the roles of AR and non-AR research papers in order to display any differences in content and intent by the authors. While Zhao achieved publication through downsizing an existing problem, and in the process makes an iterative contribution to a well studied field, Prisacariu solved a major issue facing the AR research discourse community. The noteworthy observation to make here is the fact that Zhao's paper was published in the first place. Since the AR field is still considered a new venture in the research world, certain expectations of quality are placed onto incoming evaluated AR research paper. Researchers like Zhao need not worry about such issues as the majority of natural language processing publications are incremental in nature too. This is the case for the vast majority of well established non-AR research fields. This acceptance criteria is not only limiting the potential for relatively small AR groups from contributing, but is re-prioritizing the goals and member structures of such AR groups.

Similar Genres but Different Intent

Though both AR researchers and non-AR researchers use many of the same genre sets, work in relatively similar fields, and submit their proceedings to similar conferences, the intent behind each discourse community's actions are vastly different. Established research groups in fields, such as natural language processing, have the luxury of only being required to iteratively advance the current standard. There is no major threat of a conference rejecting their proposals. AR research groups, on the other hand, do not have such luxuries. AR groups have the omnipresent understanding that research papers made without exceptional improvements is worthy of nothing. Mentalities, such as these, can permeate throughout a discourse community and influence or alter a community's initial goals.

Effects of Lackluster Research Center Quantities

It can be argued that the relatively small quantity of dedicated AR research groups directly impacts the genre choice and goal prioritization within such groups. Within the United States, there are only a handful of private businesses and roughly 15 academic establishments, including MIT, Columbia, CMU, CalTech, and UCF, with a fully dedicated AR lab. This is in direct contrast to several unrelated fields including: natural language processing, computer vision, and artificial intelligence; whose research labs can be found within every modestly ranked university.

This low count of research clusters provides the unique problem of having few collaboration opportunities. Low levels of collaboration are primarily the consequence of rivalry. The AR field is ripe with opportunities for establishing a presence. There are many unoccupied niches that deserve investigation and each research cluster wants to be the one who fills that niche. On top of that, research communities equipped with more resources and better manpower, e.g. MicroSoft, serve to dominate the competition; leaving smaller or newly formed communities with less incentive to pursue AR research with any semblance of seriousness. This ultimately means fewer AR focused research labs, which only serves to suppress AR discourse communities from developing

conventions similar to those of natural language processing discourse communities. Meanwhile, such issues are much less prominent within non-AR related fields, though they do happen from time to time. Overall, this is a bad situation for everyone involved; fully equipped AR groups are left with no collaboration partners, lesser known labs are often forced into dissolving, and prospecting labs are discouraged to enter.

Another issue related to the low number of AR research clusters involves investor relations. Interaction between an AR discourse community and an outsider requires a special genre set which might serve to bridge the gap for someone unfamiliar with the proper logistical discourse lexis. Often times, potential investors will be completely unfamiliar with the concept of augmented reality in general, so an additional layer of genre is needed to first convince them of the value in the field itself. Such genres are normally handled by a senior member of the AR discourse community exclusively.

In Professor LaViola's interview, he explained to me how he personally handles potential investors through a streamlined process using a variety of distinct genres. He explained to me that the process begins when an interested third party requests a visit to ISUE. Proceeding this is an email exchange between LaViola and either the investor or the investor's assistant. When a time is agreed upon, a separate genre is used to notify the novice members and staff. He says the demo serves two functions; to allow each party time to familiarize themselves to one another; and to display current or prospective functionalities in ISUE software. If the investor is sufficiently convinced that augmented reality is a worthy investment and is impressed with any of ISUE's work, he can agree to fund the research lab. Afterwards, a lengthy process of funding acquisition will take place, which the legal departments of both parties handle.

FUTURE WORK

The work detailed within this paper serves as a potential launching point for various future works. Analysis of the augmented reality research group in terms of activity systems seems promising. Conceptualizing how this system might operate with a historically conditioned element is not too far of a stretch and could open further inquiries pertaining to the continuously evolving nature of augmented reality. This same analysis could be performed on the next big advent in technology; some contenders for rising research: automated vehicles, space tourism, internet of things.

CONCLUSION

Research in the augmented reality sphere is currently on the rise and shows no inclination of slowing down any time soon. The comparisons performed between genres in this paper serve to show where AR discourse communities fit into the current computer science related research sector. Several shared genre types between AR and non-AR communities were found and shown to serve the same function, albeit through different means. Conversely, several aspects pertaining to research paper contents show how the requirements of a paper can differ between each group. Analyzing how AR lab quantity might affect an AR discourse community shows the importance of collaboration and expansion of the research community. More and more research groups will open in the years to follow. Current AR research systems are several years away from becoming an established field; with decreased expectations, more genre similarities, and abundant collaboration.

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