Visualising Human Dialog

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Abstract

Human dialogue is so complex that definitively analysing patterns of conversation may well be impossible. Within a conversation, all the complexities and ambiguities of natural language exist and each speaker will have his/her own speech characteristics and moods. Examining these characteristics through text dialog can be a demanding cognitive task. One reason is because the whole conversation cannot be viewed at one time. This task can be made more convenient if there is a way of visualising all this information at once through graphical patterns. Graphical patterns can revolve around the conversation, creating an abstract piece of artwork. From these patterns, one can guess at the speaker's emotion and how he/she is connected to another speaker during a conversation. This paper will discuss the different visualisation techniques that are used to represent several aspects of a conversation.

1. Introduction

This paper explains how text listings are visualised with abstract representations of the patterns of social and conversational interactions and histories. We wish to provide a visual impression of the quality or tone of the conversation that is taking place. While this information may be available through examining these characteristics through the text dialog, this can be a demanding cognitive task because the whole conversation can not be viewed at one time. One would have to inconveniently switch back and forth between postings in order to compare conversational characteristics. This task can be made more convenient and perhaps pleasurable if there is a way of visualising all this information at once through graphical patterns. We generate visual patterns from simple conversational elements such as tempo, punctuation and character usage. It is hoped that the resulting graphical patterns will revolve around the conversation, contributing to both the artistic impression and the usability of the interactive space. Figure 1 shows the patterns of one conversation.

There are several research challenges in this project such as deciding what data this should be based on, retrieving that data from the postings, creating a meaningful mapping from the text data to a visual representation, and developing an overall pattern from this mapping while keeping variations in the patterns both distinctive and spatially explicit. Human dialogue is so complex that analyzing patterns of conversation fully may well be impossible. However, within a conversation, each of us is capable of assimilating subtle nuances with the spoken word to develop our own understanding. In online typed 'chat' communication many of the conversational subtleties that so enrich our communications are lost. People have resorted to interesting uses of capitals and punctuations developing what are becoming recognized styles that can be read as emotions. In fact many of these are being called 'emoticons'.
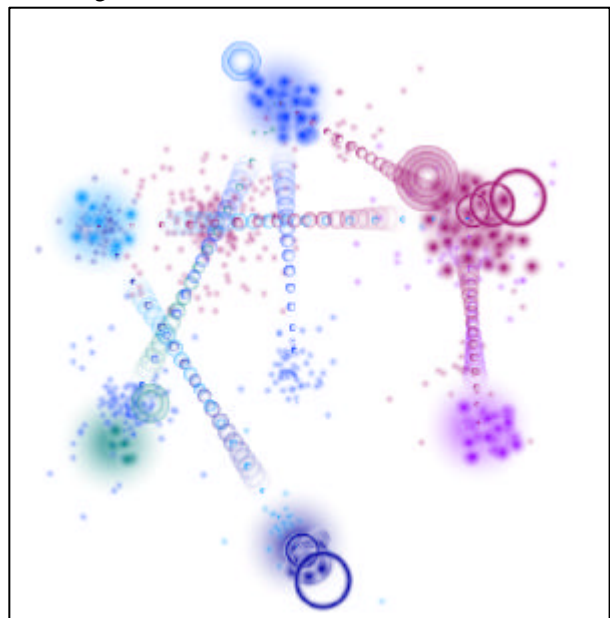

Figure 1: The pattern of a conversation

2. Related Work

There are various ways of visualising text. Most of them focus on visualising the content. Theme River [2] retrieves information about frequency of word usage to visualise thematic variations. These variations are laid out horizontally giving the impression of a river of varying thickness according to the recurring topics. Lin [4] visualises the topics and their relationships to create a 2D document space. Rohrer et al. [5] map document content to shape and use implicit surfaces to create 3D models of Shakespeare's plays. Wise et al. [10] visualise the interrelationships between documents to create Galaxies [10] and use themes found within the documents to create ThemeScapes [10].

None of these investigate portraying the spirit of a conversation. Online chat systems come closer to this goal. However, most chatspaces are either totally text-based or graphical with text insertions. Comic Chat [3] is a graphical chat space and, as its name suggests, uses aspects of comics such as balloons, spatial organization of comic characters, and the possibility of character gesture and expression. While we will not pursue the quasi-representational style of comics we are interested in the fact that Comic Chat supports incorporation of emotional information into the delivery of messages.

It is our intention to explore the creation of a visual but abstract visualisation. While there is been little research in this area, the success of Chat Circles [8] in which use of abstract visual representations are explored, indicates the potential of moving in this direction. In Chat Circles each individual is represented as a circle. Postings appear in your circle as you type. In order to 'hear' or see the words of another's posting, your circle must be close to theirs. Your next posting replaces the previous one. Social groupings form indicating who is listening to whom, size and frequency of postings are apparent.

3. The Approach

The text visualisation called Bubba Talk was developed. Currently it receives input data from text conversations. This visualisation is intended to give an impression of the spirit and timbre of the conversation. When one starts to look at the readily parse-able aspects of on-line typed communication, one realizes that there are many options. Initially we have looked at:

- the response relationship,
- the use of capitals,
- the use of exclamation marks,
- the number of words, and
- the number characters.

Presenting all of this information together in one visualisation first involves thinking about the layout of each individual speaker. In Bubba Talk, speakers are initially laid out in a circle so that connections between each individual can be easily seen (Figure 2, left image). Whereas in Figure 2, right image, the speakers are not laid out in a circle and as a result there are overlapping lines and some of the connections are covered. For this reason in Bubba Talk speakers are initially placed in a circle, but if the initial setting is not preferred the user has the choice to interactively move the speakers around.
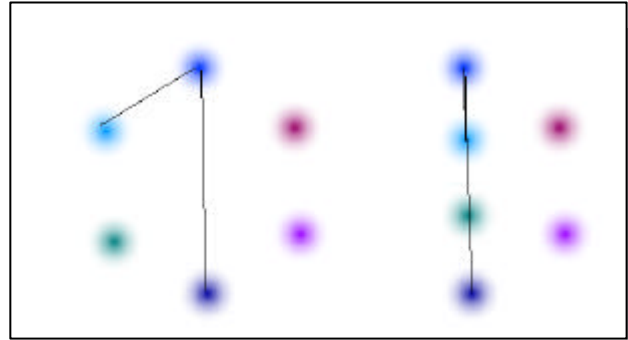

Figure 2: circle layout on the left and linear layout on the right

Different colours are chosen in order to easily distinguish one speaker from another. The colours of each individual were chosen in manner that creates an overall combination of the colours are not too overwhelming, but work together in harmony. The colour of a speaker is also used for the other aspects of the visualization that relate to this speaker.

3.1. The response relationships

There is a need to present connections between the speakers to see how one speaker responds to another. Seeing the direction, in which the speaker is talking is important in this case, so a simple line between two speakers will not be sufficient. For example in Figure 3 one can not tell whether speaker one (blue) is talking in response to speaker two (red) or the other way around.
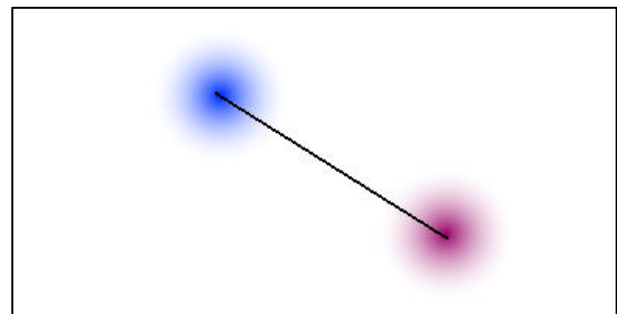

Figure 3: A non-directed connection

A simple solution to this problem is to draw an arrow to see the direction of connection, but a simple arrow is not as interesting to look at. Another approach is to use animation.
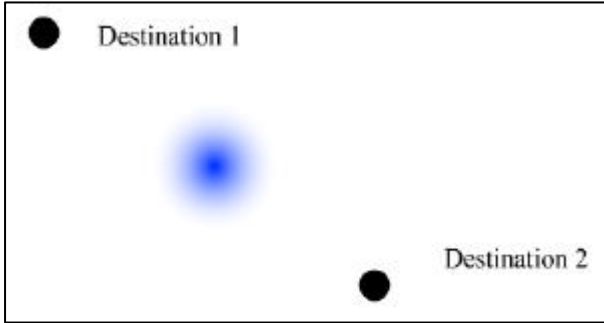

Figure 4: Animated connection shows no direction when stopped

This is effective in showing the direction of motion while the object is moving, but once the object stops the sense of motion and connection is lost, as can be seen in Figure 4 without the animation. In this case is would be nice to see the motion with a trail left behind as shown in Figure 5.
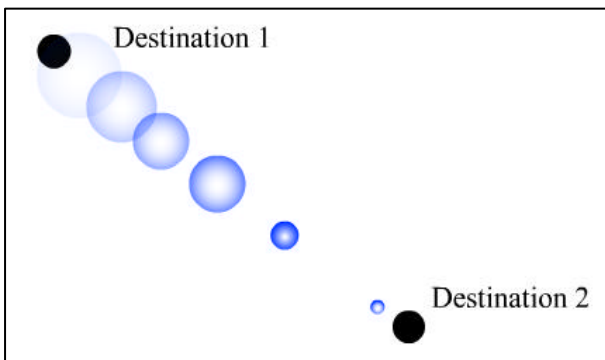

Figure 5: Circles of decreasing size indicate direction

The circles become smaller and less faded as they approach the target to emphasise direction of movement. This direction technique can be used to show which speaker is going to speak next. However, in Bubba Talk this direction of movement is used to show whom the speaker is responding to. For example, in Figure 5, lets say destination 1 and 2 are speakers 1 and 2, consecutively. In this case, speaker 1 will be talking in response to speaker 2. Depending on what type of conversation is being looked at, the direction of connection will be different, which would need to be looked at further.

Figure 6 shows the connections visualisation from a conversation between eight people. The connection lines are drawn with repeated circles. The larger circles emanate from the speaker and get small as they approach the person that is being spoken to. Notice how by directional communication is also apparent.
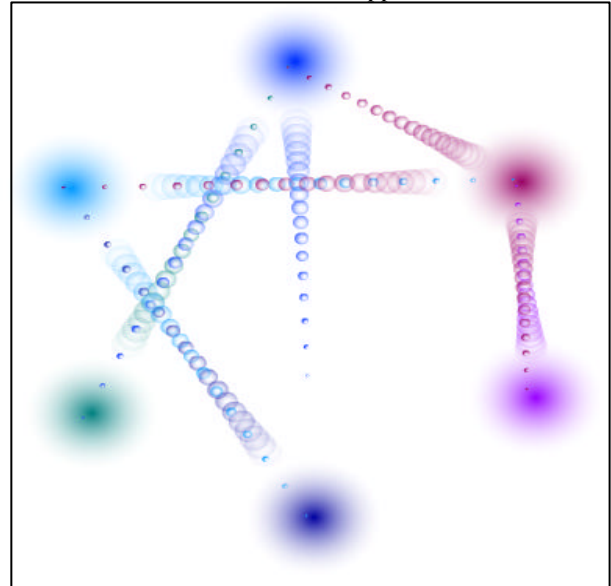

Figure 6: The response relationships

3.2. The use of capitals

In online communications repeated use of capitals has come to indicate that someone is shouting or trying to capture attention. Capitals are also used in the beginning of sentences and used in abbreviations. For this program capitals are only assumed to indicate yelling and trying to grab someone's attention if they are used repeatedly. Since flashing or flickering is also used to gain someone's attention and will be used for this purpose in the program. The number of circles represents the number of capitals used (Figure 7).
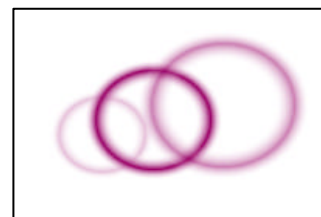

Figure 7: The capitals representation vibrates when animated

3.3. The use of exclamation marks

Exclamation marks are used to either exaggerate or emphasise a point. Exaggerations are often used in cartoons or animation by enlarging a specific feature of a person or an object. In this case, every time a speaker uses an exclamation mark an animated circle will grow in

size. As the speaker uses more exclamation marks, more circles will be created with a size bigger than the previous one (Figure 8). Each circle is transparent so the previous circles are not covered. This way the user can see how many exclamation marks there are by counting the number of circles created.
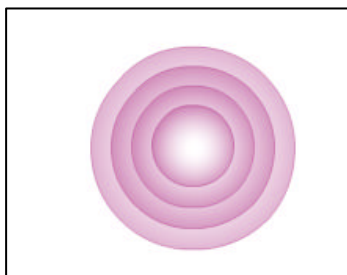

Figure 8: Repeated exclamations

3.4. The number of words

Each word in the posting is represented by a dot that hovers around the speaker (Figure 9). This builds up giving a general impression of quantity of contributions to the conversation.
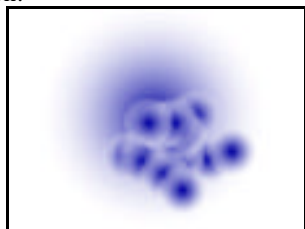

Figure 9: The words from one speech overlapping the speaker

3.5. The number of characters

Similarly each of characters is represented by a dot. Character dots are smaller than word dots and travel from the speaker to the person who is being spoken to. Character dots disperse slightly so that they can be seen distinctly. Figure 10 show the representation of two speakers.
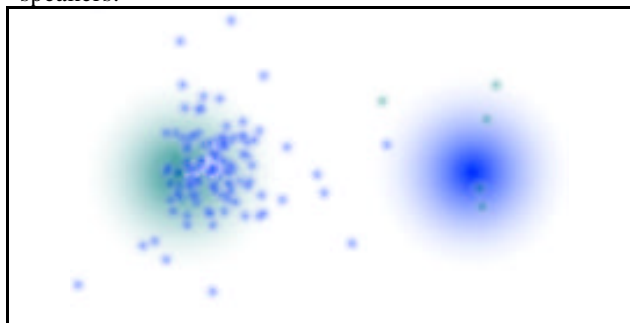

Figure 10: The small dots representing the characters travel towards the person to whom they are addressed

The green person spoke a simple utterance, perhaps hello since it only has five characters. The blue person had a much lengthier response The advantage of making the dots equal to the number of characters or words is that a sense of quantity can easily be distinguished (Figures 9 and 10).

4. Motion

Rather than moving particles at a constant speed, realistic motion requires physics of how an object travels from one destination to another. In reality if a car was moving too fast and doesn't slow down at a red light, the car will go past the red light. The car would normally have to slow down as it approaches the red light in order stop at the appropriate spot. This realistic movement effect can be calculated from formula *[A]*, so that the object travels only half the remaining distance every time.

[A]   Where we want to go = where we are + ((where we want to go – where we are)/2)

Formula *[A]* can be applied at every frame so that the object will actually appear to slow down as it approaches the target destination (Figure 11) [6]. Technically speaking the object will never approach the exact point of the final destination by using this formula because the object travels only half the remaining distance every time. In this case, it won't matter because the distance between where the object is and the final destination will eventually become so small that it won't be visible.

[B]   Where we want to go = where we are + ((where we want to go – where we are)/n)

From formula *[B]*, the variable *n* is a measure of how quickly the equation reacts to change. This is a summary of how different values **n** can approximate how an object moves.

If *n < 0*, the object will accelerate past target.
If *n = 0.5* the object will oscillate around target.
If *0.5< n < 1* the object accelerate past the target and come back the other way, then will eventually stop at the target after a few bounces.
If *n = 1* the object will get to the target immediately with no realistic effect.
If *1 < n < 2* the object will slow down as the particle gets closer to the target.
If *n > 2* the object will never reach the target.
This movement effect is useful in moving one object, but if there was more than one object such as in the Bubba Talk, an adjustment to the algorithm will be needed. The problem with using the original formula is that all the duplicated objects will follow the same path so that all the objects will start overlapping one another and will end up

appearing as one object. To create a natural movement of particles without overlaps, a swarming behaviour algorithm is used. Swarm travels as whole to a single destination, but individual swarm members have slightly different destinations. As a result each individual in the swarm will land slightly to one side of its neighbour as shown in Figure 12.
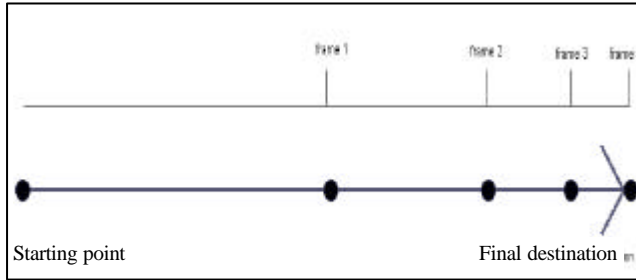

Figure 11: Slowing down when approaching a target

Using formula *[B]*, one can apply this swarm effect by adding a random number to (where we want to go – where we are) and the *n* value will also need to be adjusted to get the right speed movement toward the target. This motion is applied to the character representations and to the word representations. The characters travel as a swarm to their intended destination. The words merely swarm around the person who said them.
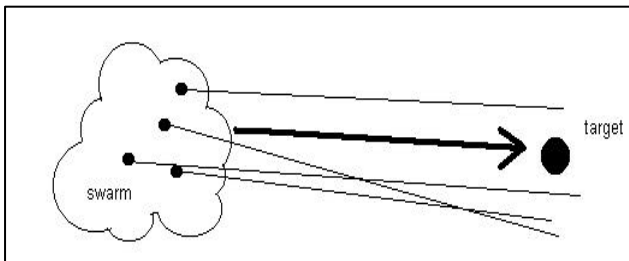

Figure 12: the dark arrow indicates the principle direction. The lines indicate the directions of individual particles.

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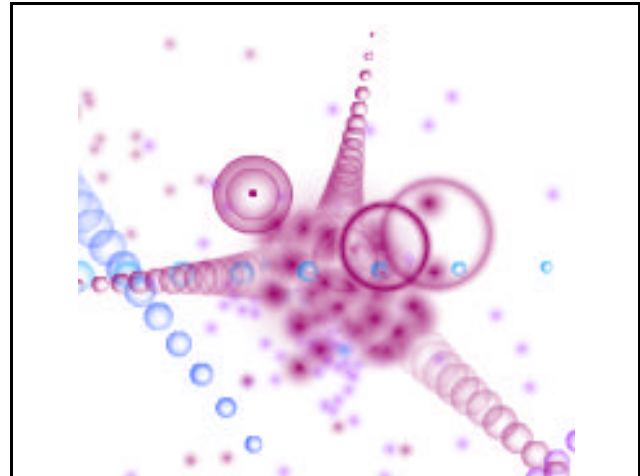

Figure 13: One person talking to people all around them gives a general party air

5. Emerging Patterns of Conversation

The individual components can be viewed as a whole (Figure 1) or in any chosen combination. Figure 14(a) shows the word contributions to this conversation. Figure 14(b) show the characters and Figure 14(c) show the use of capitals and exclamation marks. As more individuals start to speak, more patterns will be generated and will eventually clutter the screen. This can be addressed in that visualised aspects of the conversation fade with time or as just stated by selecting only a chosen subset of the visualisations to be displayed.

6. Future Considerations

Currently Bubba Talk parses typed text. We are interested in incorporating these ideas with on-line conversations in real time. Further development of a will address the following:

- Creating more visualisations for different punctuations such as question marks, commas, backspaces, and emoticons etc, to give more characteristics to the mood of the conversation.
- Exploring how different texture techniques, such as Noise Algorithms, can also be applied adjustments to the visual patterns.
- Extending the program so that different data files of conversation can be used, and different patterns from different conversations can be compared at a time.
- Studying whether these visualisations are meaningful to people. Informally, people have said it provides the flavour or perhaps intensity level of a conversation and some have claimed to recognise a friend's style. However, this still needs to be investigated

- Preserving patterns of a particular conversation. It would also be nice to be able to save the patterns generated instead of having them disappear completely when the reset button is pressed.
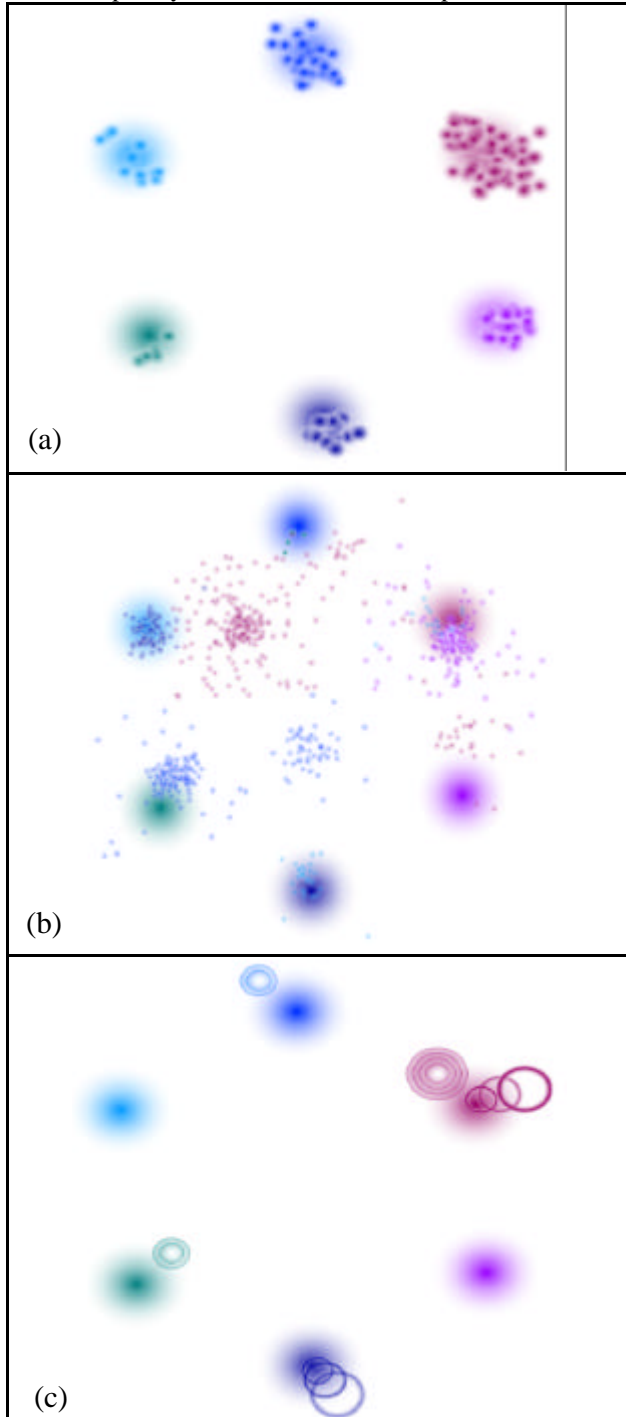

(a)

(b)

(c)

Figure 14: Visualising different aspects (a) words, (b) characters and (c) capitals and exclamations marks

7. Conclusion

Bubble Talk has shown that many characteristics of a conversation can be visualised. From looking at the resulting pattern one can see who was interacting more and who was not interacting as much. One can see who was talking to whom and who was ignoring whom. Also we investigated the application of simple aesthetics to visualisation. Analogous colours and variations on a single shape, the circle, were used exclusively for all the representations.

Bubba Talk was created to explore visual ideas for representing human dialog and serves to show how graphical patterns can be visualised to reveal the some aspects of the mood of each speaker when they are speaking and of the connections between the speakers.

8. Acknowledgements

9. References

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