Topics on Bible Visualization: Content, Structure, Citation

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Abstract

Text visualization begins with understanding text itself which is material of visual expression. To visualize any text data, sufficient understanding about characteristics of the text first and the expressive approaches can be decided depending on the derived unique characteristics of the text. In this research we aimed to establish theoretical foundation about the approaches for text visualization by diverse examples of text visualization which are derived through the various characteristics of the text. To do this, we chose the 'Bible' text which is well known globally and digital data of it can be accessed easily and thus diverse text visualization examples exist and analyzed the examples of the bible text visualization. We derived the unique characteristics of text-content, structure, quotation- as criteria for analyzing and supported validity of analysis by adopting at least 2-3 examples for each criterion. In the result, we can comprehend that the goals and expressive approaches are decided depending on the unique characteristics of the Bible text. We expect to build theoretical method for choosing the materials and approaches by analyzing more diverse examples with various point of views on the basis of this research.

1 Introduction

Text visualization researches had focused on visualization of words and keywords based on text's word counts. However, text visualization researchers have diversified tools and methodologies for expression and expended research fields. Anything could be materials and approaches for text visualization now. Examples such as Lev Manovich's visualization of characters in Hamlet, His Dark Material trilogy text visualization as the story progresses, and visualization of networks of characters in Korean writer Park Kyunglee's novel The Land' show this tendency very clearly.
Text visualization starts with understanding of the text itself. To understand any text, understanding the text itself and its traits should be preceded before visualization process starts. Only after text traits were deduced from the full understanding of the text, the goal and expression methods should be decided. Therefore, this study aims to establish theoretical underpinnings of text visualization approaches.

In this research, we chose the Bible as the materials of text data visualization. The Bible is globally known and its digital data can be easily accessed everywhere and thus its diverse text visualization examples exist. Moreover, it is a history book holding profound hidden doctrines, which allows different interpretations depending on researchers' various point of views.
Also, visualization results are created in varied ways. In this sense, we can comprehend that the goals and expressive approaches are decided based on the unique characteristics of the Bible text. This research aims to build theoretical foundation for choosing right materials and approaches by analyzing more diverse examples with various angles and views.

2 Traits of the Bible Content

2.1 Vast Content and Long History

The Bible contains a total of 66 books: the Old Testament consists of 39 books and the New Testament contains 27 books. It has overall 1,189 chapters and 31,039 verses. The number of authors of the Bible is known to be around 40 people and it covers almost 1600 years which is the longest period covered by any history books or novels. The fact that the Bible contains such vast content, different characters and a long history stresses the need for visualization which allows easier and intuitive understanding of data.

BibleGateway.com's *Holy Week Timeline* (Figure 1) is a good example of an attempt to understand the text intuitively. Holy Week Timeline visualized incidents happened during the Holy Week. This image shows main characters and important keywords of events by applying the format of subway line maps. A close-up of the image shows Jesus in Gethsemane and his betrayal by Judas in a sequential order. This visualization allows intuitive understanding of four different books' storylines based on "who", "what", and "where" of events.
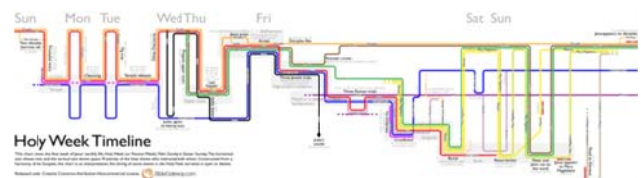

Figure 1: *Holy Week Timeline; © Biblegateway.com*

Figure 2: *The Spread of Christianity in the Bible's book of Act; © azbible.com*

The Spread of Christianity in the Bible's book of Act (Figure 2) is a different example of the Bible visualization. While Holy Week Timeline focuses on the time-event-character relationship, The Spread of Christianity in the Bible's book of Act tries to connect

geographic information from the Bible to timelines of the Bible. It covers 30 years of time described in Acts of the Apostles of the New Testament while evangelists began spreading Christianity in various regions. This work uses videos to show the order in which places are mentioned in Acts of the Apostles.

This work shows 105 places in Asia, Africa and Europe which were mentioned a total of 364 times in Acts of the Apostles. It is difficult to show the flow of time in one image, but this work succeed to show the flow of time using videos for carrying information in a more dynamic and easier way. This is an example of visualization for intuitive understanding of the Bible content which covers such various places and long time.

This kind of visualization cases aim to show the Bible content more intuitively since it is difficult to understand the Bible text at a glance due to it covers lots of events which had happened in such a long time. These cases are trying to meet the basic goal of visualization which is to provide information intuitively.

2.2 The Network of Characters in the Bible

The Bible covers 1,600-year of period. Therefore, inevitably, there are a great many characters in the Bible. To understand the text clearly, it is necessary to arrange and list those characters first. Therefore, many researches have been conducted in attempt to divide main characters from sub characters or to draw maps of characters' relationship.

In a similar perspective, there are many cases of visualization of characters' network. Mapping God's bloodline (Figure 3) is one of them. The Bible contains main characters' bloodlines centered on the birth of Jesus. Therefore, with visualization of God's bloodline starting with Adam, it could show the network of main characters. Mapping God's bloodline indicates interesting relationships between Jesus, Joseph and Maria showing all of them are actually the descendants of David. This visualization provides intuitive information on bloodlines which cannot be attained by simply reading the Bible in sequential order. In other words, this visualization shows sequential events and networks of characters intuitively, and provides a whole new experience to understand content narration.
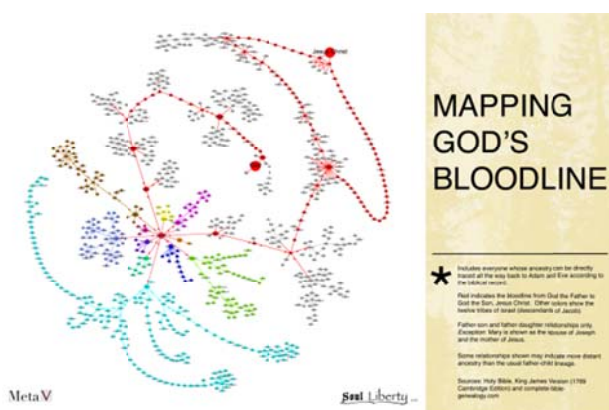

Figure 3: *Mapping God's Bloodline; © Robert Rouse*

While Mapping God's bloodline visualized the bloodlines of Jesus, Bible Social Network (Figure 4) visualizes the Bible's social network by connecting every biblical name in the Bible.

Chris Harrison developed an algorithm which connects names whenever two names occurred in the same verse. This method is similar to a method of visualizing social networks. Clustering process can be derived from this method. Harrison used entities with 40 or more connections only and rendered them horizontally while less important nodes are drawn at an angle, which improves its readability. The size of words is proportional to the number of connections so that keywords appear bigger.

The result derived from this visualizing method might not be the most efficient way to deliver information on the Bible content itself. However, when viewers are well aware of the content, they could notice that this work fully shows more accurate information on the Bible content. Assuming that characters in the Bible are closely connected, clustering between characters is possible in disregard of the time and narrative gaps.

For instance, this visualization result could indicate a closer relationship between Moses and the New Testament. The New Testament frequently cites Moses which is a character from the Old Testament. Therefore, despite the time gap between them, a closer relationship could exist. Also, Saul and Paul are placed distantly from each other even though Saul and Paul are actually different names of the same person. This could seem inaccurate when it comes to carrying the exact information on a character, but it is meaningful considering Saul (before converting) and Paul (after converting) have almost nothing in common including social networks, neighborhoods, and beliefs they had.

To understand the network of characters hidden in the complicated Bible text, it is necessary to use diachronic approaches unlike ones we are using when we read historical books which mainly focus on characters. Hidden messages could be derived based on the hermeneutic visualization.
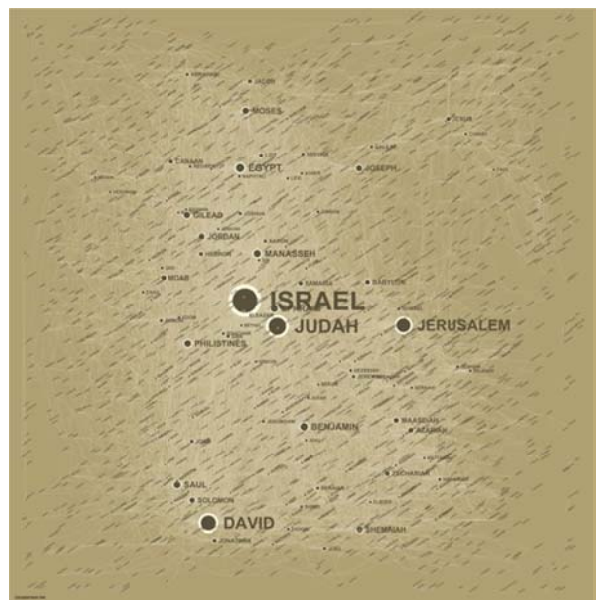

Figure 4: *Bible Social Network(People and Places); © Chris Harrison*

2.3 The Mixture of Genres

One of the main traits of the Bible is that it is a mixture of different genres of literature. The Old Testament could be sorted

into different categories: legal documents (Taurat), legends (Sodom and Gomorrah), poems, statistics, genealogies, chronicles, and history books. History books are also sorted into literary sketch (the Book of Ruth, the Book of Esther) and legends of heroes (Saul, Daniel, and the Judges). The prophets such as the Book of Daniel and The Book of Zechariah fall into a category of apocalyptic literature. The Book of Job, the Book of Ecclesiastes, the Book of Proverbs, the Book of Psalms, and the Song of Proverbs are all poetries. In case of the New Testament, it could be sorted into gospels (Matthew, Mark, Luke, and John), the Acts detailing the work of Christ's followers in propagating the Christian faith, and many other Epistles. The last book, The Book of the Apocalypse of St. John, is a revelation literature.

These traits of the Bible allow many unique visualization methods. Processing Bible Visualization (Figure 5) is a case in point. Each chapter of each book of the Bible is displayed as a filled rectangle, beginning with Genesis in the top left corner and ending with Revelation in the bottom right corner. If the keyword appears more frequently in one chapter, the rectangle representing it is highlighted. This work has many intriguing aspects. For example, the word 'Jesus' appears brighter in the bottom parts of the canvas since the word 'Jesus' appears in the New Testament only. The Four Gospels have brighter parts comparing the Epistles explaining Christian attitudes.
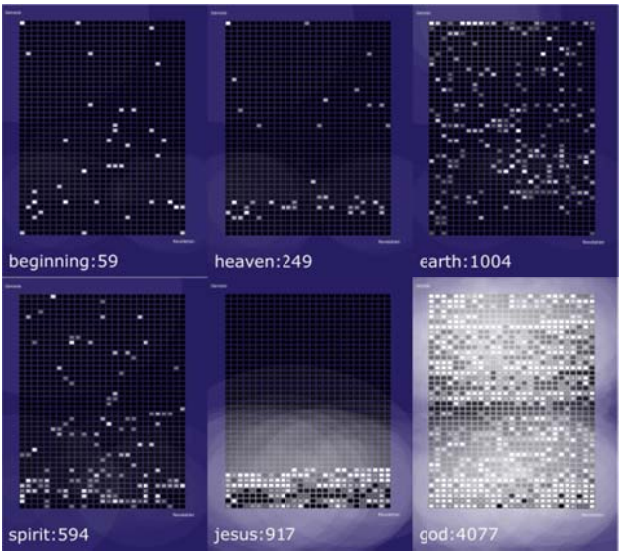

Figure 5: *Processing Bible Visualization; © hydrogen2oxygen*

3   Structural Traits

3.1   Nonsequential Narrative Structure

The Bible has many books which have different genre and traits. The Bible contains literary books and didactic books and they do not always follow time narratives. Due to this non-sequential narrative structure of the Bible, readers have tried to read this in a chronicle order for a better understanding. One of those attempts is Visualizing One-Year Bible Reading Plans. This website started with providing a graph that lining up the books in a chronicle order and now it provides even the daily text based on a one year plan of reading the Bible.
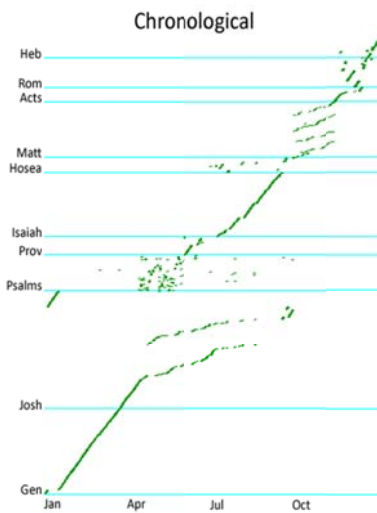

Figure 6: *Visualizing One-Year Bible Reading Plans*

Figure 6 is a graph showing the chronological reading plan. It tells which books to read and how much to read in an order in which events occurred in one year. This graph efficiently shows the complex structure of the Bible. One can know that Psalms has the wide historical distribution while the Four Gospels are parallel passages through this graph.

Unlike Chronological Bible which effectively visualized the non-sequential narrative structure of the Bible, Anh Dang's Gospel Spectrum (Figure 7) fully accept the non-sequential trait of the Bible. This interactive visualization work shows narrative gaps and let readers understand the content more intuitively.
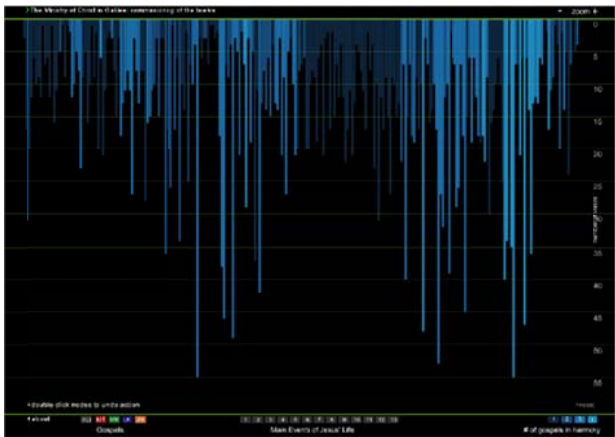
Figure 7: *Gospel Spectrum; © Anh Dang*

The Four Gospels (Matthew, Mark, Luke, and John) covers the life of Jesus. They basically recorded events happened in the same era. Even though the four books have same temporal backgrounds, they are divided into four different books and listed in the order of Matthew, Mark, Luke, and John. The Gospel Spectrum is designed to enhance the understating of the same narrative described by four different point of views. It also used four different colors to distinguish each gospel from one another. At the same time, this work uses different length of bars which is proportionate to the length of each verse, which helps readers intuitively understand the difference between four books. Through

this visualization work, detailed and overall information on four different books covering the same era could be attained.

3.2 Various Translations and Editions

The Bible has been translated into almost every existing language. Since it is translated into various languages and in cultural backgrounds, the translation process often tends to rely on translators' interpretation. The original Bible was not written English. Therefore the Bible has many translated or revised English editions. There are two different trends in the Bible translation. One is more controversial trying to keep the original verses and the other is to change the original verses and make it easier to understand.

Quantifying Traditional vs. Contemporary Language in English Bibles Using Google NGram Data (Figure 8) is a visualization result showing trends in the Bible translation. This work compares the original text and the texts translated into different languages. The one which changed much is the one using more contemporary vocabulary: The result shows that more contemporary translation is widely accepted these days compared to the past.

Figure 8: *Quantifying Traditional vs. Contemporary Language in English Bibles Using Google NGram Data; © openbible.info*

4 Citation

4.1 Cross-reference

The Bible is one of the most important religious books in the world. It repeats the content on purpose to emphasize its doctrine, which in turn creates cross-reference information. The Bible's cross-reference data are one of unique traits of the Bible, and main materials for the Bible visualization.

Bible Cross References between Books (Figure 9) visualizes similarities of different texts from the Bible. Once one enters a Bible verse to search for cross references, a pattern could be provided based on visualization of detailed interests. After finding a specific pattern in the upper part, one can also find out how the cross reference occurred in the bottom part. According to the visualization result, 'Joseph's dream' in Genesis and 'Daniel's fantasy' in Daniel have cross references.

Figure 9: *Bible Cross References between Books; © OpenBible.info*

Chris Harrison's Bible Cross-References (Figure 10) is another example. Each chapter in the Bible is represented by one bar. Those bars are listed from left to right and Books alternate in colors. Each of the 63,779 cross references found in the Bible is depicted by a single arc. The color corresponds to the distance between the two chapters creating a rainbow-like effect. As a result, this image shows that numerous cross references are found in the Bible and which books are more closely sharing cross references. However, this work is not efficient when it comes to carrying specific citation information because it aims to visualize cross references. The Bible has lots of cross references because the goal of the Bible is to emphasize the religion's doctrine - promises and trust, and it repeats the same content to highlight them. Therefore, it is more reasonable to consider this visualization work as a symbolic visualization that visualized the rainbow which is one of the important promises in the Bible content.

Figure 10: *Bible Cross-References; © Chris Harrison*

4.2 Bible Citation

The content of the Bible are considered as a fundamental part of European and North American history and culture. The Bible has provided social practices and morals in those cultures. These days, the Bible influences not only Europe and the United States but also in most countries. In this sense, citations and quotations of the Bible is one of the most important traits of the Bible. As the number of SNS users has been on the rise, citations of the Bible are increasing too. Moreover, information and data on citing the Bible have been the newest materials for the Bible visualization.

According to the 2010 Bible Tech Conference, 2.3 million bible quotes were created on Twitter from April 7, 2009 to February 28, 2010. Also more than 16 million bible verses were cited. Tweeting the Bible (Figure 11) provides information on the Bible citation on Twitter. Each square mean each chapter and darker

chapters are more popular. The number in the middle of each box is the most popular verse in the chapter and sparklines in each box show the distribution of the popularity in each chapter. This image shows the Psalms and the Book of Proverbs are most commonly cited, and verses like Romans 8:28 or St. Paul 4:13 are the most popular.
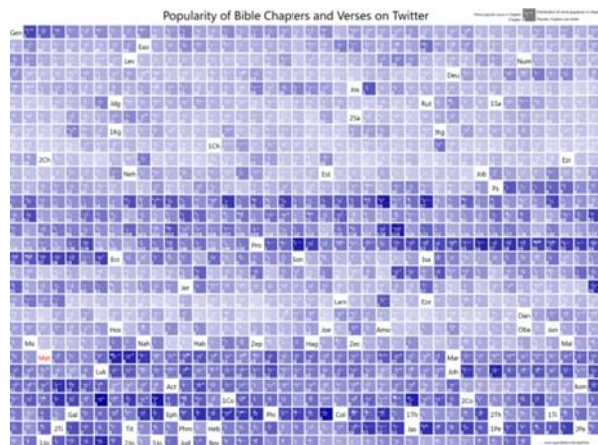

Figure 11. *Tweeting the Bible; © 2010 Stephen Smith*

Kushal Dave's Exegesis (Figure 12) shows the patterns of citation based on the context. Since the Bible has the absolute influence in various cultures, people tend to quote the Bible as a strong evidence in attempt to stick to their opinions and convince others. When users cite the Bible verses in certain occasions on Twitter and other websites, a specific pattern could be found. For instance, the word 'abortion' never appears in the Bible but websites on which people are talking about abortion often cite related verses. As Fig 12 shows, citation of the Psalms is most common. 'For you created my inmost being; you knit me together in my mother's womb (Psalm 139:13)' is one of the examples. After all, this visualization result carries information on the pattern of the Bible citation which cannot be found by data analysis or simple quantification of Twitter.
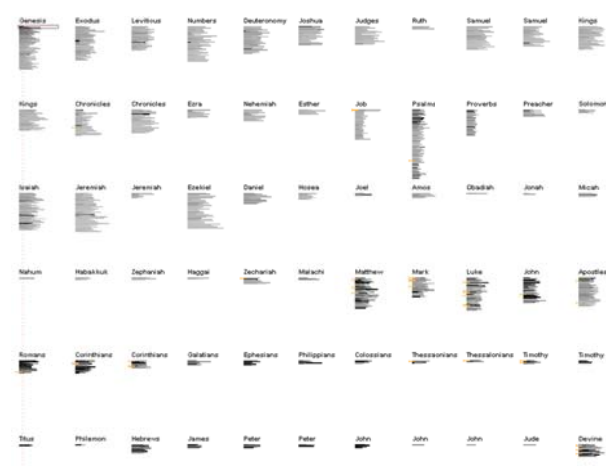

Figure 12. *Exegesis; © Kushal Dave*

5   Conclusion

This study reviews various Bible visualization cases. Without deep understanding of the text itself and its unique traits, the design and interpretation of visualization clearly have limits. Different visualization approaches can be conducted depending on the unique traits of the text. In this sense, it is important to set a goal for visualization and find the right approaches for that goal based on the systematic analysis and examination. This study aims to build theoretical foundation which helps choose the right materials and approaches for visualization by analyzing more diverse examples from various point of views.

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