Venn Versus Relation Diagram Models For Database Relation in SQL Command Line

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Abstract. The study was to analyze the difference between two diagrams, such as a Venn and relation diagram. Comparisons are made based on syntax in SQL Command-Line, primarily when used the Select condition clause. The sample command used for diagrams was inner join and where syntaxes. The diagrams will act as data representation for the Relational Database to display an outline of data relationship analysis. The results obtained that difference between them was significant. The Venn diagram was useful to evaluate how the attribute in the table is connected. The opposite, the relationship diagram, shown how the dataset was related to the tables. Therefore it recognizes the data that had to deceive. However, the more data related then, the more diagram is complex.

1. Introduction

Entity Relationship Diagram (ERD) usually uses for Database Design. The point is how one table has a relationship to another table. The study of [1] showed that the relation to the attribute is more significant for understanding the relationship between tables—one solution is to extract the relation diagram schema of ERD to obtained information in developing a database table using DBRE.

When related to a database, we have known the Relational Database[2], which has related data from the table. A relational database presents information in tables by rows and columns. The database relations itself needs a primary key and a foreign key to an association between table relations. The benefit of between keys that able to filter data based on homogenous data type keys. The filtering data formed into the query.

Therefore, developing the query using SQL Language such as the sample in [3], [4]. The most famous condition statement is “Select.” Furthermore, almost we forgot that the condition for the relationship pertains to syntaxes concerning, which is the difference use between “Join” and “Where.” Therefore, the SQL statement for relation we present Mathematical Models in the study. Likewise, the models have related to the relationship in a set are a Venn diagram and relation diagram. In other words, the diagrams can serve as visualizing data for Relational Database, the purpose of showing an overview in analyzing data relations.

2. Methodology
As mention before, the condition of the SQL statement using Mathematical Models such as Venn and relation diagrams. The use of modeling depends on the syntax used in “Select.” A Venn diagram is a model that visualizes the relationship between various sets, which is proposed by John Venn[5]. Based on the study of [6][7] that a Venn diagram usually uses for the “Join” clause.

In the study, we use inner join syntax to attach data based on homogenous sets in keys. Figure 1 has followed to a Venn diagram for inner join, which is Table A, Table B, and Relationship R (alias relationship table).

![A Venn Diagram for Inner Join](image1)

**Figure 1. A Venn Diagram for Inner Join**

The basic syntax for inner join as follows[7]:

```
SELECT table1.column1, table2.column2...
FROM table1
INNER JOIN table2
ON table1.field1 = table2.field2;
```

To observation about how many tables that the relationship formed which should make in a Venn diagram is:

\[ VD = n + (n - 1) \]  

(1)

Which is VD as a Venn Diagram, n as the number of circles for the tables (for example, Table A and B), (n-1) as an inner join for Relationship R

Meanwhile, the relation diagram indicates how relation set of data in the query. The concept is similar to a Venn diagram, which needs keys. The relation diagram represents the figure as follows:

![The Relation Diagram](image2)

**Figure 2. The Relation Diagram**
The SQL syntax for the relation diagram is[7]:

```
SELECT table1.column1, table2.column2...
FROM table1, table2
WHERE table1.field1 = table2.field2;
```

To calculate how many the Relationship R should create in the relation diagram:

```
Table 1. Number of Relationships Based On n Sets

| Sets | 2  | 3  | 4  | 5  | 6  | 7  |
|------|----|----|----|----|----|----|
| Rows To- | 1  | 2  | 3  | 4  | 5  | 6  |
| (n-1)  |    |    |    |    |    |    |
| Relations | 1  | 3  | 6  | 10 | 15 | 21 |
```

Relationship diagrams that should make n sets based on the following equation:

\[ U_n = \frac{1}{2} (n(n + 1)) \]  

(2)

The Relational Database had data normalize before developing the query. Normalization is an easy way to make a relationship, as a benchmark is the formation of primary keys and foreign keys. We develop the query using SQL Command-Line.

SQL Command-Line is a command-line interface for accessing Oracle Database XE that enables operating SQL, PL / SQL, and SQL*Plus commands[8]. The following is sample tables which used for the relationship in a Venn and relation diagram using SQL Command-Line:
Based on Figure 3, 4, and 5, the table that created are table AA, table BB, and table RL. The table RL relates to table AA and table BB because they had StudentID and SubjectID attributes as keys. The relationship between tables (the primary key marked bold and the foreign key marked with italic) that descript as follows:

AA = {StudentID, Name, Address}
BB = {SubjectID, Subject, Semester}
RL = {StudentID, SubjectID, Disciplines}

3. Result and Discussion

The query developed with SQL Command-Line with syntax as follows:

```
SELECT * FROM AA INNER JOIN RL ON AA.StudentID=RL.StudentID INNER JOIN BB ON BB.SubjectID=RL.SubjectID;
```

**Figure 6. The Query with Inner Join Clause**

Based on a Venn diagram concept as Figure 1, Table RL should be in the middle between table AA and table BB. The reason that table RL has a connection which it had foreign keys of StudentID and SubjectID. Developed a Venn diagram based on Figure 6 is n= 2, they are two tables, AA and BB. n-1 is 2-1, which means one table for relation: table RL as a relationship table. Therefore, we had three circles to join for making a Venn diagram. The development of a Venn diagram for detail as follows:

```
Table AA
Name
Address

| StudentID | Name | Address |
|-----------|------|---------|
| 101       | John | 123    |
| 102       | Jane | 456    |

Table RL
Disciplines

| StudentID | Disciplines |
|-----------|-------------|
| 101       | Math, Eng   |
| 102       | Sci, Math   |

Table BB
Subject
Semester

| Subject | Semester |
|---------|----------|
| Math    | 2        |
| Sci     | 3        |
```

**Figure 7. Relationship Table RL to Table AA and BB**

When we had five tables, for example, then n = 5 tables and n-1 = 4 relationship tables. The total of circles we made is 5+4 = 9 tables. Which means a Venn diagram should make is Table1+Relationship Table1+Tabel2+Relationship Table2+Tabel3+Relationship Table3+Table4+Relation Table4+Tabel5.

Another syntax to building the query with the Where clause as follows:
The concept of relation diagram is that keys have the same data in tables to make relationships. A relation diagram was developed based on calculating the number of relationship attributes table. The total attributes table RL in Figure 3 is \( n = 3 \). Therefore, rows of \( n-1 = 2 \), and based on Table 1, we got a relation \( U_2 = \frac{2(2+1)}{2} = 3 \) which detail in Figure 9.

However, even though the data in table RL is all related. While the foreign key in table RL met with the primary keys in table AA and BB. A partial data of keys which not related (shown in Figure 10). In other words, The data may not appear in the query. Somehow the relation diagram showing the relationship data in detail.

Based on the explanation of Venn and relation diagrams, as mention before, the difference is visible. On the Venn diagram only shown the attributes of relation in the table without looking out the
data. Therefore, the Venn diagram is only used to analyze how the attribute in the table is related. Furthermore, similar to the inner join clause, the relationship table shall be in the middle between two tables. In comparison, the relation diagram showed how the dataset related to the tables. Therefore, the data which have mislead is detected. However, the more data related then, the more diagram is complex.

4. Conclusion
The interpretation we draw in the analysis that just displayed the relationship characteristics in the table without looking at the details on the Venn diagram. The Venn diagram is also only used to evaluate how the attribute is connected. Besides, the relationship table would be in the middle of two tables, equivalent to the inner join clause.

The relationship diagram shows how the dataset was linked to the tables through contrast. Therefore it recognizes the data that had to deceive—however, the more than linked details, the more complicated the diagram.

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