CHAPTER 9

SUMMARY

9.1 Summary and Conclusion.

Here, we shall summarize chapter-by-chapter work of research of the main body comprising the chapters 3 – 8.

9.1.1 Chapter 3: A summary.

Main aspects which can be viewed from this chapter is the gradual development towards the idea of cohomology and its style of looking at various algebraic objects in the space underlying. This chapter basically focused on understanding the concepts of cohomology spaces and the algebraic structures with the focus on one such kind of arrangement known as the Kunneth arrangement which is a derived part of the Kunneth theorem or more popularly known as Kunneth formula.

The maturity of the chapter graduates with a focus on the description of the cohomology spaces and its overview in the nature as it is viewed from the other viewers as it has been studied till now from the time of the definition of the cohomology space. As the chapter moves ahead from the basic idea of cohomology in describing the algebraic structures in its space there is the point of introducing and investigating the potential Kunneth arrangement given by the abbreviation symbol $K_\alpha$ and later forming the kind of graph which is named as the Kunneth graph depending on the type of triangular type of arrangement observed.

This chapter also leaves a further scope of investigating the graphs thus created under the varieties and other axioms related to it. The last part of the chapter focuses on the projection of these defined Kunneth graphs from the cohomology space into the real planes.

9.1.2 Chapter 4: A Summary.

As we see the above chapter touches most of the graphical aspects of the desired Kunneth graphs whose theories are developed in the previous chapter with various properties, on the other hand the chapter also focuses on the introduction of the special linkage of the Moment graphs to this theory.
This happens by merely identifying the type of moment graphs which follow a Bruhat graph order. There are various instances in the beginning of the chapter that focus on the graphical aspect of the Kunneth graph given by $K_g$.

Though the chapter is less fortified with diagrams as compared to its preceding chapter, however it does provide a generalized formation of the Kunneth graph in the planar field. There is an important aspect of this chapter that describes the Kunneth graph with reference to its direction. This descriptive property of directed Kunneth graphs is manifested with the help of three scenarios with the help of three cases discussing the non-directed Kunneth graphs, the clockwise directed graphs and the anti-clockwise graphs.

There is one such important part in the case 2 that gives a proposition to prove the Kunneth graph to be quasi-connected in a real plane. This property of quasi connectedness of the Kunneth graphs might give a link to many important applications of it. There are many such expectations for more such localization properties of the Kunneth graphs as seen in the current chapter catering the application over the real planes and also seen in the previous chapter that gives an important aspect of the projection of the Kunneth graph type of arrangement of topologies from cohomology spaces on to the real plane.

9.1.3 Chapter 5: A Summary.

As we move towards the conclusion of the current chapter that talks on majorly on the title of coordinate mapping of the Kunneth graph, we shall briefly run through the various aspects of the work that spreads on the ideologies explained above in various parts. The basic chapter begins with the thought of visualizing the property given by Schnyder and manifestation of the concept over the triangular graphs. These visualization further gives scope of unveiling the same concept of the Schnyder properties to be associated to the triangular form of the Kunneth arrangement rather than the triangular and further the inner triangular graphs. The parallel aspect of the chapter that lies on the understanding of the concept of labeling along with the coordinates to be treated on the Kunneth graphs which satisfies the Schnyder’s property to flourish over the triangular graph formation. We need not forget the extension of introducing the similar work on Kunneth graphs and investigating its behavior with the invasion of the labeling concept of the Schnyder’s property. This investigation
induces a part of work to be carried on to the Kunneth graph projected on to a Real plane with the
labeling property in the form of Barycentric coordinates.

The part of the chapter that deals with the introduction of the Barycentric coordinates prevails a
limited part of the theory over the part and at the end of the chapter gives a limited scope to explore
the type of labeling of coordinates on to the Kunneth graphs. The later part of the chapter that follows
the climax gives a precise definition of the Barycentric coordinates over the Kunneth arrangement of
the graph so traversed over the real plane in the form of an integral with the desired boundary values.
The further expansion of the effectiveness of the Barycentric coordinates over the Kunneth graphs
with graphs projected on the real plane with the geographical coordinates acting under the influence
of the topological coordinates shall be discussed in the later chapter exclusively before the starting of
the most interesting and the most awaited part of the research work on the hurricane study. Limited
scope of entertaining the application of the Kunneth graphs designed under the cohomology
localizations and further structured under the moment graphs is seen in this chapter. A better
magnitude of visualizing the geographical coordinates over the Kunneth graphs is the major part
expected to manifest in the later chapter.

9.1.4 Chapter 6: A Summary.

Summarizing the chapter involves a series of inter related aspects that are advancing gradually
with one topic ascending to the another and so on continuing till the discussion of the graphical
structures. As the title of the chapter suggests the influence of the geographical coordinates onto the
Kunneth graphs, we see a gradual introduction of the concepts relating to certain graphical structures
that are used to visualize the structure. This structure is further bounded with certain locations that act
as the vertices of the graphical structure.

There feels a need to also understand that the bounding vertices that cover the graphical
structure also act as the topologies that create a sub outer covering of the graphical structure so
created. Though the three vertices are associated in a triangulated graph just a single case of the
directed graph is assumed as in the case of clock wise directed and the remaining cases are assumed
accordingly as also discussed in the chapter four. The main case that is considered excluding the other
two cases as that of the anticlockwise directed and non-directed graphs will further follow the same
assumptions as seen in the earlier chapters.
There is a need where the chapter uses a specific part of the geographical location is taken under the area of study. This area is the southern coastal part of the United States of America, the Florida region and further advancing to the Southern borders of the North Carolina. The very basic reason to choose this region is the cause in the later part of the chapter where we use the concepts of the previously investigated Kunneth arrangement and the properties of the Kunneth graph to be used to analyze the part of the hurricane studies and to the very best knowledge the areas of the Florida region where the gulf of the Mexico and the tapering part of the North Atlantic Ocean borders the region taken under consideration and is also a very highly infected area prone to many catastrophes like hurricanes from the past several years. Hurricane study is a concentration of one of our area of research in the later chapters which demands the area to be fortified with the detailed study of such a geographical area. Before we talk more on the later chapter of the hurricanes, move back to the summarizing of the current chapter.

As we move ahead to brief the mid part of the chapter we see many diagrams that talk on the inner triangular graphical formation of the inner triangular graphs which manifests the description with many diagrams depending on the conditions required accordingly. The diagrams with triangular structures thus describe the triangular graph orienting the inner triangulated graphs that give a significant ideology in the study of planar graphs where individual paths or walks are of great importance. This importance refers to the association of the vertices that are adjacent in the parent triangular graph and the inner triangular graph thus oriented inside it as well. In a different case the triangulated graphs are also referring to the topologies and such similar structures.

We also see a gradual formation of the inner triangulated graphs in one of the cases which shows the orientation of the structures. Further moving to brief the later part of this chapter we tend to give some of set of definitions that cater some specific walks in a graph that is directed in a specific way. This definitions further are used to isolate the importance of the graph as that observed from any other directed graph with similar features. The main aspect of introducing these definitions is to manifest to understand the approach of a walk in the type of a directed graph. This walks gives a link to the orientation to the formation of the inner triangulated graphs.

Now the later part of the research is left to conclude in the next chapter which showcases the detailed study of the graphs so formed on the plane with the labeling of the geographical coordinates.
This finally proposes the climax to this chapter with a scope of study on many other mathematical aspects like transformations of vectors and topologies in a planar field, the theory of matrices and many such similar concepts to create links towards the hurricane path study and other related investigations.

9.1.5 Chapter 7: A Summary.

This chapter gradually moves ahead to detail the important features of the research, we first try to elaborate the importance of the chapter over the other chapters and its linkage to the forthcoming chapters. The current chapter preferably talks about the efficiency of the formed Kunneth graphs and its real life applications. The real life applications include the involvement of a geographical map and the study the behavior of the Kunneth graph over it. The initial part of the chapter talks on the involvement and the choice of the geographical area under consideration. This area taken under consideration is further parameterized in such a way so as to influence the fitting of the Kunneth graph or the fitting of certain locations with the coordinates of the Kunneth graph acting as the location coordinates for the map.

The actual scenario deals like invoking the triangular formation of the geographical location map and the Kunneth graph over it. This chapter further advances with the three locations of the Kunneth graph to be labeled with the geographical coordinates. This gives a formation of the triangular structure to form over the Kunneth graph. There are various possibilities studied over this so formed graph with the varieties involving the efficiency over the other possibilities. In order to study a certain location in more detail the Kunneth graph over the geographical location is further considered to be splitting over a particular edge that shares the vertices labeled as A and C.

The reason to choose these labeled vertices is well elaborated in the section 7.3 where there is a concept used that has an importance motivated from the economic theory and that is given by the breakeven point to split the edge where the vertices A and C are sharing it. These splitting up of the edge further gives rise to the graph to split into two separate graphs that are directed independently as seen in the figure 7.3 where a proper coloring pattern is used to describe the differentiation among the graph that is split into two different ones.
Now going ahead with the same idea on splitting of the graph we see the work moves on ahead with the focus on one of the sub graphs formed due to the splitting of the main triangulated graph. This involves the focus on the graph that borders the Florida region with the upper part tapering the Georgia and the South Carolina. The geographical location coordinates for these locations form the unique labels for each of these topological vertices of the so formed triangulated graph. These topological vertices of the sub triangular graph are further traced to have certain properties for the analysis of the sub graph to retain the properties as that of the parent triangulated graph. This process of analysis involves the graph to check for continuity of various elements throughout the graph.

The event of continuity is known with different scenarios. There are two scenarios discussed to understand the continuity pattern maintained by the sub graph so formed. The first scenario involves the linear continuity over the edges between any two vertices and thereby over the entire graph. The second scenario involves the surface continuity that talks about the surface that is bordered by the three vertices of the Kunneth graph so formed and its neighboring edges. The process of justifying the linear continuity and the surface continuity is carried out with different mathematical operations that also involve a proposition 7.1 that acts as the main aspect to satisfy much of the reasons in describing the surface continuity of the graph.

After the cases involving the type of continuity is observed and the sub graph is declared as to follow its own independent appearance even after splitting from the main triangular graph, there is a further demand to see more of its application over many such geographical locations. These locations will further ensure to concentrate study and fitting of the Kunneth graph on the areas affected by the hurricane and its path. This is the further extension to the main motive of this Kunneth graph and the adjoining theory.

9.1.6 Chapter 8: A Summary.

The chapter is the main part of the research that intends to give the various applications of all the mathematical theories and the certain graphical concepts as discussed in the past many chapters. We may recall at many instances the assumptions of the Kunneth graphs over the cohomology space and its understanding of projection over the real space and further its visualization over it as well. These graphs which are derived in the form of various maps of the hurricane occurrence data is used from
the google maps and images that further developed to manifest many such features that are to be applied over such graphs using various tools and also altering the mapping image accordingly.

The is a need to also understand the influence or the interference of the hurricane with reference to the theory of the Kunneth graphs or the arrangement of the Kunneth form of vertices as seen in the previous chapter. For the same reason this chapter shall endorse real life hurricane maps with the advent of fitting and further visualizing and analyzing the hurricane map over a Kunneth pattern.

The chapter also plays an important role in the showcasing of the application of the Kunneth graphs over the hurricane paths and its importance with reference to many such areas. These areas may develop further scope to avail more research prospects for the use of Kunneth graphs in the insurance models and the hurricane path as well. The major aspects of the chapter deals with the development of the relationship of the theory that describes the Kunneth graphs and the areas of research that deals with the understanding of the Kunneth graph and its baseline theory of probabilistic view in estimating it. The chapter comprises with the initial part on the extended description of the Kunneth graph and the further linkage of the physiological features of the Kunneth graphs and the formation of the Triangular and the inner triangular structures.

These Kunneth graphs so formed are further fitted with the hurricane paths and thereby also linked to the study of association of the location coordinates that are located onto the bordering graphs traced by the graph of the Hurricane. In order to understand this theory the hurricane data for the past decade is taken into consideration. This data comprises of the hurricane paths for the past 15 hurricanes that are occurred in year wise formation. The Kunneth graphs so formed are further analyzed over the hurricane path taking into consideration the number of edges and the number of topological vertices so formed accordingly. This data is further correlated with certain concepts from the traditional methods of hurricane path study and its effect on the insurance industry.

The data in the form of category of hurricane and the number of vertices for each hurricane path over the fitting of the Kunneth graph is traced over a graph. This graph result the positive correlation in between the two entities and thereby hold a certain justification of the approach of the study of the hurricane path with the help of Kunneth graphs. We shall see further briefing of the current work in the next chapter that summarizes the entire aspect in a gist of series for every term.