FACEBOOK USE IN THE WESTERN MARYLAND APPALACHIAN REGION: RESTAURANT/CAFE BUSINESSES

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ABSTRACT

Small businesses in Appalachia are an important segment of its local economy. One way small businesses can promote themselves is through social media. This study discusses the use of Facebook by local restaurants/cafes in Garrett, Allegany and Washington counties of Appalachia. For this purpose, the Facebook posts created by 25 local restaurants/cafes during 2016 were extracted and analyzed. The relationship between characteristics of the posts including their types and timestamp as well as the words used in them are analyzed and their relationship to the popularity of the posts (in terms of number of likes) are evaluated. To analyze this relationship, an analysis of variance (ANOVA) as well as three predictive models, namely the classification and regression tree (CART), random forest (RF) and support vector machine (SVM) are used. Surprisingly, it was found that Facebook use by local restaurants is not necessarily compatible with the trends that can lead to the popularity of their posts. Using a clustering method, it was found that the words that affect the popularity of a post point either to a menu item or to an event/deal. It was observed that posts containing promotional words have a higher chance of being popular. Moreover, the posts containing words related to seafood were also more popular than those that did not.

INTRODUCTION

Small businesses are an important segment of the local economy. The Small Business Administration's website states that the 23 million small businesses in the United States account for 54% of all US's sales (US). It also reports that small businesses have created 55% of all jobs since the 1970s. There are over 600,000 franchised small businesses in the US, accounting for 40% of retail sales. An average of 540,000 new small businesses started since 2014, and many of these businesses do so with limited budgets. Many of these businesses took advantage of the opportunity to use social media as a tool for reaching their target audiences.

The small businesses used in this research are located in a part of the Appalachian Region of the United States. With an approximate population of 25 million people, it includes 420 counties in 13 states that extend along the inland east coast, from southern New York to northeastern Mississippi. Those states also include Alabama, Georgia, Kentucky, Maryland, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia. Though the region experiences widespread poverty as compared to the rest of the nation, some counties have seen economic growth and prosperity. However, other Appalachian counties need basic infrastructure development, which includes simple necessities such as roads, water, and sewage systems. Table

1 shows the Appalachian Regional Commission's (ARC) definition for "Levels of Economic Growth." These index values start at the top ten percent of counties and descends to the bottom ten percent of counties. Figure 1 provides a graph of the ranked index values.

Table 1. Definition of Levels of Economic Growth

Term	Definition
Attainment	Attainment counties are the economically strongest counties. Counties ranking in the best 10 percent of the nation's counties are classified attainment.
Competitive	Competitive counties are those that can compete in the national economy but are not in the highest 10 percent of the nation's counties. Counties ranking between the best 11 percent and 25 percent of the nation's counties are classified competitive.
Transitional	Transitional counties are those transitioning between strong and weak economies. They make up the largest economic status designation. Transitional counties rank between the worst 25 percent and the best 25 percent of the nation's counties.
At-Risk	At-Risk counties are those at risk of becoming economically distressed. They rank between the worst 11 percent and 25 percent of the nation's counties.
Distressed	Distressed counties are the most economically depressed counties. They rank in the worst 10 percent of the nation's counties.

Definitions Courtesy of Appalachian Regional Commission:
http://www.nccommerce.com/Portals/2/Documents/CommunityDevelopment/ARC/ARCCountyEconomicStatus_DistAreas_FY2011_NorthCaro.pdf

Figure 1. Ranking Index Values for all U.S. Counties
(Image ARC County Economic Status Designation by National Index Value Rank)
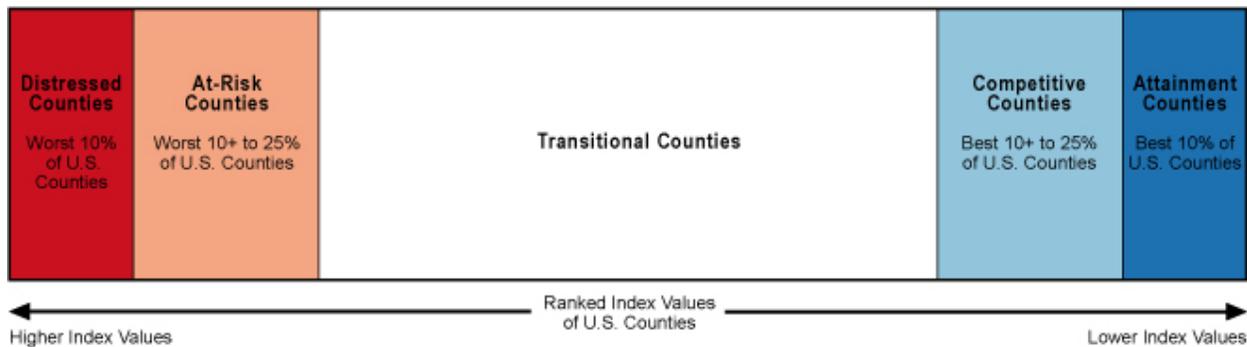
For this study, three counties located in the western panhandle of Maryland were chosen due to authors' prior studies of the region and for a preliminary examination of businesses' present Facebook use as a promotional tool. However, researchers' future studies will be expanded studies covering various levels of economic growth so we can compare results among levels. The counties and their populations are Garrett (population 30,000+), Allegany (population 75,000+) and Washington (population 147,000+). The Appalachian Regional Commission lists all three counties as "Transitional" because they fall short of national norms and often contain economically distressed areas Table 2 lists the counties and their number of distressed areas. Even though all

three counties in Maryland are designated "Transitional," only Allegany and Washington Counties have designated areas labeled as "Distressed" by the Appalachian Regional Commission.

Table 2. Maryland's County Economic Status

County	Economic Status	Number of Distressed Areas
Allegany	Transitional	3
Garrett	Transitional	0
Washington	Transitional	3

Currently, many small businesses are aware that Facebook can help get the word out about their business. In Appalachia, as per the researchers' investigation, limited business owners are using Facebook to their benefit, while others are missing-out on new customers or connecting with current ones. An advantage of Facebook is that it can be used without purchasing ads. Today any small business can have a Facebook page deliver its information. For example, if a new coffee shop opens on Main St. U.S.A., within a matter of minutes/seconds, they can display the phone number, address, map, menu, specials, and events. Facebook provides an opportunity for businesses to link to customers effectively, including helping customers to find information pertinent to locating them. In order for customers to keep coming back, businesses need to update Facebook page regularly.

The purpose of this paper is to investigate the use of Facebook in the western panhandle of Maryland, as a business tool especially in the restaurant/café sector. More importantly, this research identifies the communication modes used in Facebook, i.e., content of the post and creation time of post, to determine which are most popular. It examines the effective ways of using Facebook that give restaurant/cafe businesses better opportunities to enhance their advertising beyond traditional approaches.

REVIEW OF CURRENT LITERATURE

This review of literature will examine present research and information about small businesses and their use of Facebook as a promotional tool. Facebook has had more than 214 million active users in the United States as of January 2017. Three-quarters of 18 to 29-year-olds use a social networking site, with Facebook topping the list (Taylor & Keeter, 2010). Profit and nonprofit organizations create profiles within social networks, like Facebook, to take advantage of the high consumer ratings that the site attracts (Orrell, 2009; Roberts & Roach, 2009). Not only does Facebook provide a more convenient way to communicate, but it also provides a format that reassures engagement which results in developing relationships (McCorkindale et al., 2013). Facebook and other social networking sites makes it an option for corporate and educational organizations to cut costs while still reaching their main audience (Ganster & Schumacher, 2009). Tredinnick (2006) defines Facebook as a social networking site because it is driven by user participation with user-generated content. Facebook was founded in 2004 by Mark Zuckerberg, and has quickly became one of the most popular websites in the world (McCorkindale et al., 2013). In April of 2006, the Facebook registration process for organizations became available and more than 4,000 organizations joined within two weeks (Waters et al., 2009). Users on Facebook can

create and join groups, which many are organizations, and "like" pages (McCorkindale et al., 2013).

Organizations are using Facebook to include marketing, customer service, fundraising, information dissemination, and stake holder engagement (Orrell, 2009; Roberts & Roach, 2009). Approximately three quarters of the Fortune 500 companies have a Facebook page, with 87% of 500 respondents claiming to "very familiar" with Facebook (Barnes, 2010). Over three-fourths of these respondents confirmed that Facebook had been successful for their organization. Charities in the U.S. seem to be the most involved, with 93% indicating that they are on Facebook and more than three-quarters said that social media held some importance to their organization's success (Barnes & Mattson, 2009).

Incorporating social media into the organizations' existing strategies to improve communication is a main goal. Credibility and relationships can improve by listening and participating in conversations with transparent communication (Holtz & Havens, 2008). Marketing Director, Randi Zuckerberg, explained that whenever a person "likes" an organization on Facebook, they are building awareness of that company among their "friends" (Zuckerberg, 2010). An opportunity created by Facebook for companies is for the public to give their opinions through "likes" or by commenting on the company or organization's "wall". Organizations should respond to the comments posted on their "wall" because it will encourage that person to post again (Henderson et al., 2010). This will also show the user that the organization is listening and responding to issues.

As of 2015, approximately 65% of adults have started using some form of a social networking site (Perrin, 2015). Research has shown that a majority of users on these sites think that companies should have more of a presence and use it to interact with their customers (Bitner & Albinsson, 2016). Not only does social networking sites allow companies to interact with consumers, but it also allows them to interact in a timely manner and on a personal level. Social networking sites also allow companies to solve customer service issues immediately and gain feedback directly from the person buying the product.

A major challenge that organizations face when using Facebook is maintaining an authentic persona (McCorkindale, 2010). Bulmer & DiMaurio (2010) suggest that companies should be more mindful that the main reason for using social networking sites, like Facebook, is to collaborate with the consumer rather than to merely sell a product. Bergström & Bäckman (2013) found in a study that users want to see unique and personal posts from the companies rather than pure marketing tactics. Also, organizations may find it a challenge to convince management of the significance of having an online presence (Ganster & Schumacher, 2009).

Broekemier et al. (2015) found in a study that small businesses do not use social media that often because they believe that other types of advertisement are more important and that it is too hard and time consuming to update a social network site. Small businesses should be made aware of certain benefits that come from using Facebook and other social networking sites, like increasing brand recognition, and they should put more effort into building relationships with their consumers that will come at a lower cost for the company than traditional advertising. To create the same level of awareness as companies with larger marketing budgets, social networking sites can be the key for a more cost-effective marketing plan for small businesses (Quesenberry, 2015).

To ensure best results for a small business, companies should focus on posting information about sales and promotions and even make contests and giveaways for consumers which will help with increasing engagement (Bitner & Albinsson, 2016). Small, local businesses should also be aware that all genders are equally receptive to companies on social networking sites, so they should give an equal amount of attention to all gender identities.

Social networking sites have become very significant in consumer decision making in areas such as increasing awareness, sharing information, forming opinions and attitudes, purchasing, and evaluating buyers' satisfaction (Mangold & Faulds, 2009). Specifically, consumers rely on online reviews for information when planning hotel and restaurant reservations (Jeong & Jang, 2011; Kim et al., 2011). As a matter of fact, travelers are more likely to trust other consumers, posting their comments on social media, over comments posted on the travel agent websites (Pantelidis, 2010).

Facebook is one of the most popular websites for external communications among corporations. Companies have been using information from other social networking sites on their Facebook page (Kwok & Yu, 2013). For some companies, consumers are allowed as well as urged to post comments on their websites and even log into to their websites using Facebook credentials (Kwok & Yu, 2013). The endorsement of users on Facebook are important in indicating the effectiveness of a company's social media strategies (Kwok & Yu, 2013).

Electronic word of mouth (eWOM) has become important in travel planning (Kim et al., 2011; Litvin et al., 2008). A crucial factor of eWOM is the "convenience and quality assurance" (Kwok & Yu, 2013). Jeong & Jang (2011) looked at the relationship between restaurant services, such as quality of food and service, the atmosphere, price fairness, and consumers' motivations of positive eWOM, such as concern for others, expressing positive feelings, and helping the restaurant company. Results showed that food and service quality and the atmosphere can trigger positive eWOM. Kwok & Yu (2013) found that photographs and status messages seem to gain more attention from Facebook users than links and videos.

STUDY METHODOLOGY

For an examination of businesses' present Facebook use as a promotional tool in the three counties located in the western panhandle of Maryland, restaurants/cafes were chosen due to high utilization of social media (Jeong & Jang,2011). There were only twenty-five non-chain restaurants/cafes are in the region who are using Facebook actively. Table 3 lists the chosen businesses, their Facebook User Name, City and Zip Codes. Figure 2 depicts the location of business in the state of Maryland.

Table 3. List of restaurants, their Facebook User Name, City and Zip Code

Facebook User Name	Restaurant Name	City	Zip Code
@acesrundeepcreek	Ace's Run Restaurant & Pub	Oakland	21550
@honihonibar	Honi Honi Bar	Oakland	21550
@mezzoscumberland	Mezzos	Cumberland	21502
@shootersmd	Shooters Bar & Grill	Cumberland	21502
@TheDraftBarAndGrille	The Draft Sports Bar & Grille	Frostburg	21532
@MtnCityCoffee	Mountain City Coffeehouse and Creamery	Frostburg	21532
@ninerscanalpub	Niner's Canal Pub	Cumberland	21502
@1goodskewer	Skewers, Kabobs & More	Cumberland	21502
@BlackBearDCL The	The Black Bear Tavern & Restaurant	McHenry	21541
@brendaspizzeria	Brenda's Pizzeria	Oakland	21550
@datrirestaurantlavale	D'Atri Restaurant	LaVale	21502
@DeepCreekSeafood	Deep Creek Seafood	Oakland	21550
@deepcreekuno Uno	Uno Chicago Grill	Oakland	21550
@GBoones	G Boone's	Boonsboro	21713
@giannispizza	Gianni's Pizza & Wings	Cumberland	21502
@Giuseppes.Net	Giuseppe's Italian Restaurant	Frostburg	21532
@henhousefrostburg	Hen House Restaurant	Frostburg	21532
@TheCornucopiaCafe	The Cornucopia Café	Grantsville	21536
@thedeerparkinn	The Deer Park Inn	Deer Park	21550
@DAtriSubsEtc	D'Atri Subs Etc.	Cumberland	21502
@hccandm	High Country Creamery & Market	Grantsville	21536
@AntietamBrewery	Antietam Brewery	Hagerstown	21740
@DeepCreekDonuts	Deep Creek Donuts	Oakland	21550
@gunterhotel	Gunter Hotel	Frostburg	21532
@SavageRiverLodge	Savage River Lodge	Frostburg	21532

Figure 2 - Depicts location of the restaurants
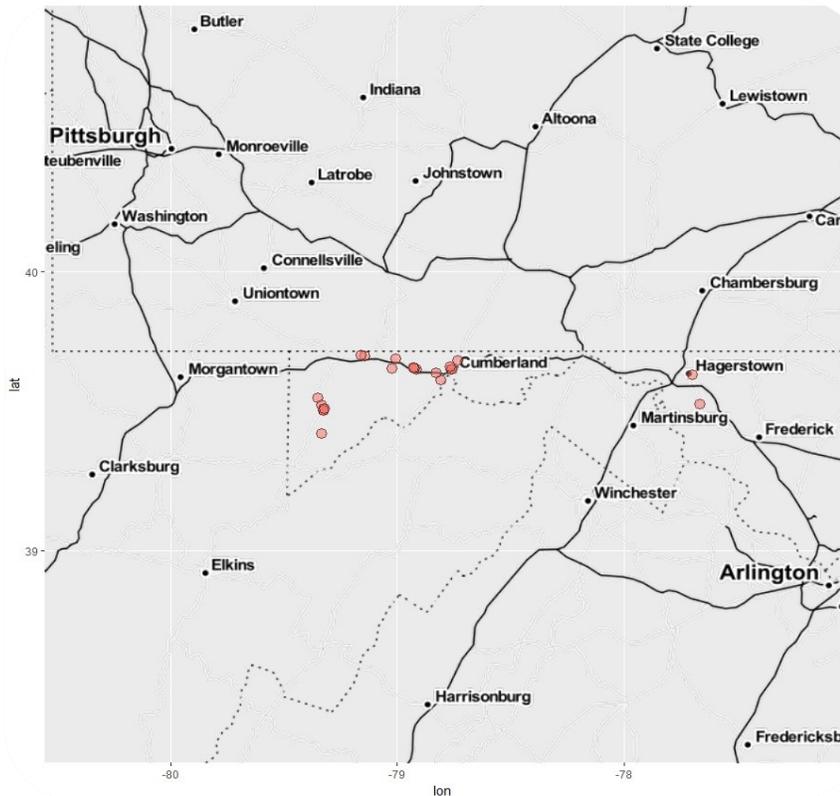
After identifying restaurants/cafés and using the Facebook application-programming interface (API), 4,278 posts, posted during 2016, along with their type and timestamp were extracted. To separate the highly liked posts from the rest, each post's number of likes were normalized into a z score. For this purpose, a z score for a post is calculated as $z = \frac{l - \mu_{posts}}{\sigma_{posts}}$ in which, l is the posted number of likes, μ_{posts} is the average number of likes and σ_{posts} is the standard deviation of number of likes. The posts with $z > 0$ were considered highly liked or popular posts while the posts where $z \leq 0$ were considered less popular posts. To understand the relationship between a post's characteristics – such as type and time of posting – and its popularity (expressed as high or low), a series of analysis of variance (ANOVA) were conducted.

In addition to a post's characteristics, words used in it can also affect its popularity. Unlike characteristics of a post, it is not usually a straightforward task to analyze the contents of textual data. Textual data, such as the words used in a post, is usually highly unstructured and a word can be present in it in different forms. Hence, it is necessary to convert the post's text into structured data before usage. For this purpose, several operations were done on the posts (Feinerer, 2017):

- Cleaning the text: remove any non-text character, lowercasing every character, eliminating punctuation and extra spaces between words.
- Removing the stop words: eliminating the words that usually do not contain any useful information such as "your", "I'm", "don't", etc.
- Tokenization: parsing the text into sentences and words.

- Stemming: converting a word to its root form. This step converts different forms of a word to a single one.
- Creating a Document Term Matrix (DTM): a DTM is a matrix that shows the frequency of words in posts.
- Removing sparse terms: If the total frequency of a word over all the posts is less than a threshold, that word is eliminated from the DTM. This operation helps to reduce the size of DTM and highlight more relevant terms.

Using DTM, it is possible to evaluate the effect of words in a post and its relationship with the post's popularity using predictive models. In this study, three predictive models are used: a classification and regression tree (CART), random forest (RF) and support vector machine (SVM). A CART model classifies data through recursive partitioning of the dataset (including posts and the words used in them) into mutually exclusive subsets, which best explain the variation in the dependent variable (i.e. popularity) under observation (Ardjmand et al., 2016; Biggs et al., 1991). Random forest (RF) is an ensemble of classification trees created by bootstrap samples of data. Usually in RFs, the prediction is made by aggregating the prediction of ensemble members (Svetnik et al., 2003).

SVMs, originally developed by Boser et al. (1992), is generally used as a classification and regression tool. The main idea of SVMs is that nonlinear trends in data can be converted into linear relationships in a higher dimension space (Ghalehkhondabi et al., 2017a; Ghalehkhondabi et al., 2017b). It is shown that SVMs can perform well when used for high dimensional data such as textual data (Shanahan & Roma, 2003). In the next section, the results of analyzing the Facebook posts are presented.

ANALYSIS AND DISCUSSION

The posts extracted from Facebook have been posted at various times of the day and in different types. Table 4 tabulates the percentage of the posts based on their types. Table 5 shows the percentage of the posts based on the creation time. Table 6 shows the percentage of posts based on the day they were created. Table 7 shows the percentage of posts based on the season they were created.

Table 4. Percentage of the posts based on their types

Event	Link	Photo	Status	Video
6.49	4.58	77.28	8.88	2.76

Table 5. Percentage of the posts based on the creation time during the day

Morning (5:01 AM – 12 PM)	Afternoon (12:01 PM – 5 PM)	Evening (5:01 PM – 9 PM)	Night (9:01 PM – 5 AM)
40.97	30.29	3.01	25.71

Table 6. Percentage of posts based on the day they were created

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
17.37	14.86	11.31	8.04	16.80	15.52	16.08

Table 7. Percentage of posts based on the season they were created

Spring	Summer	Autumn	Winter
39.76	20.17	10.04	22.01

To measure the effect of a post's type and creation time, four ANOVA analyses were conducted for type, creation time during the day, week days and season. The variation in all four variables were found to be statistically significant in determining the number of likes. Table 8 shows the tabulated results. It was found that video posts have the highest chance of being popular. Moreover, the posts sent out in the morning, during summer time and on Friday, Saturday and Sunday were found more likely to become popular ($z > 0$).

Interestingly, some of the social media use of local restaurants is not compatible with the trends observed. For instance, while it is observed that posts sent out in the morning are more popular, local restaurants tend to send out most of their posts in the afternoon.

Table 8. Results of ANOVA for type, time of day, weekday and season variables

	Degree of Freedom	Sum square	Mean square	F value	P value
Type	4	88	22.11	22.56	<2e-16
Day time	3	14	4.581	4.593	0.003
Week day	6	18	3.006	3.015	0.006
Season	3	190	63.45	66.36	<2e-16

Figure *3* depicts the boxplot of the normalized likes count (using *z* score) based on the post's type and timestamp.

Figure 3 Variation of the normalized number of likes based on post type and time of creation
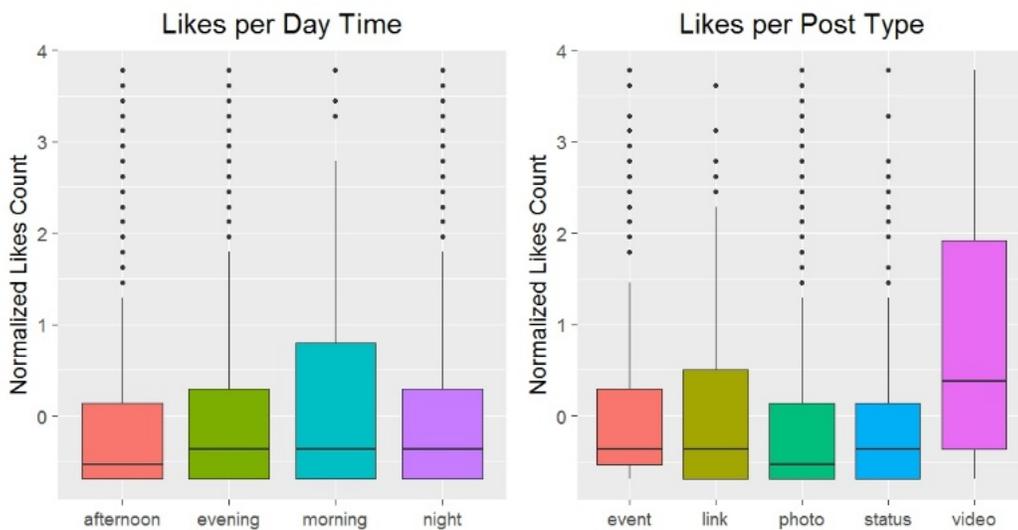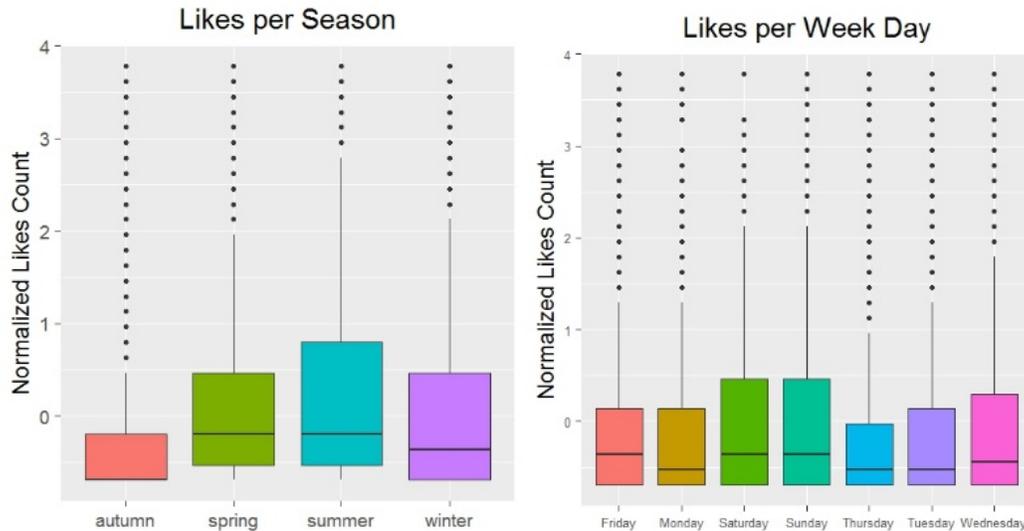
To find the keywords that affect the popularity of the likes, classification and regression tree (CART), random forest (RF) and support vector machine (SVM) models were built and tested. Popularity of the posts (popular vs less popular) was considered as a dependent variable while the words in the posts were independent variables. Splitting the posts into two sets of train and test, the accuracy of CART, RF and SVM on the test dataset was found to be 73.0%, 75.0% and 74.1% respectively. Hence, RF was chosen for further analysis. Using RF and considering the mean decrease Gini coefficient, some of the most important keywords include the following:

Grill, Frostburg, special, great, pizza, share, shrimp, crab, salmon, lunch, cheese, weekend, grill, tonight, and night.

One notable observation regarding the words that increase the popularity of menu-posts is that they included seafood items. However, the popularity of seafood in the evaluated counties needs more analysis. To further understand the keywords and their effect on the popularity of a post, they were analyzed using a hierarchical clustering. Clustering was performed based on the appearance of a word in a post. In general, two meaningful clusters (themes) were found in the posts. One cluster contained the words related to an introduction of a restaurant's menu item while the other clusters were found to represent the events and promotion of services and foods by the restaurants. Next, the collective mean decrease Gini coefficient for each cluster was calculated. It was found that, in general, promotional posts receive higher positive reactions compared to the posts that introduce menu items.

CONCLUSIONS

Facebook is an inexpensive marketing opportunity for any small business. Being available 24 hours a day, Facebook can network businesses with customers on demand. These same individuals can give and receive quick feedback and responses. In this study, the use of Facebook by local restaurants in Garrett, Allegany and Washington counties was evaluated. For this purpose, using Facebook API, 4,278 posts, posted during 2016 by a sample of 25, restaurants along with their

type and timestamp were extracted. It was found that 77% of the posts are photos. Most of the posts were created in the afternoons, and during the spring.

Using ANOVA, it was found that posting type and time significantly affect the popularity of posts. The posts that contain visual content, such as videos, were found to be more popular. Moreover, the posts that were created in the morning, during the weekends or in the summer were also more popular. Interestingly, it was observed that Facebook use by restaurants is not necessarily compatible with the trends that can lead to highly liked posts.

In order to evaluate the relationship between a post's text content and its popularity, three predictive models were built and compared: classification and regression tree (CART), random forest (RF) and support vector machine (SVM). It was found that RF has the highest accuracy in predicting the popularity of a post based on the words used in the post. In general, two types of words were found to positively correlate with the popularity of a post: menu item introductory and promotional words. Using a mean decrease Gini coefficient for each group of words, it was observed that the posts that contain promotional words (such as "special" and "tonight") were usually more popular compared to menu item introductory words (such as *shrimp*, *crab*, *salmon*). Moreover, it was found that seafood related words increase the popularity of posts.

The results of this research offer some tips for local restaurants in the reviewed counties:

- Understand the company's customer base: What does the average customer respond to in a post (videos, posts, photos, or event announcements).
- Be mindful of the time of day customers are accessing the information.
- Upload and change frequently the videos and photos of products or something relevant to the business.
- Make sure to include seafood items in the menu and promote them on the Facebook.
- When creating a new post, pay attention to the words that can increase the popularity of the post. Promoting events and deals are more popular compared to introducing menu items.

LIMITATION AND FUTURE RESEACH

While being insightful, this study has several limitations. In this research, only Facebook practices of local restaurant/cafes were evaluated. Including other forms of social media into research can draw a more comprehensive picture of the social media practices of restaurants/cafes. Another limitation of this research is that it only surveyed restaurants/cafes in the Maryland Appalachian Region, which may not be applicable to other regions of Appalachia. In addition, this study focuses on three counties located in the western panhandle of Maryland with the same level of economic growth. However future studies should be expanded studies covering various levels of economic growth and other part of Appalachia so we can compare results among levels and regions.

Several directions can be followed for the future research. Currently, the study only focuses on the posts initiated by the businesses. However, it would be more informative if the posts initiated by customers and shares are also considered. Using other predictive models to gain insight into the relationship between posts and customer response can also be another future research direction. In this regard, using various ensemble methods as well as other classification methods are suggested.

Future studies can examine the interaction among for categories (types, time, day, and season of posting). For example: If certain particular type of posts place in the morning interacts with other categories. In addition, studies could be made more interesting by doing phone survey to collect critical data such as "Do you think Facebook drives your sales?", "How to compare with other social media?", "What Facebook feature do you like the most?", "How do you compare Facebook promotion and traditional marketing?", Etc.

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