Dannible & McKee, LLP

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Solving the Puzzle of Data Analytics

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What Are We Covering Today?

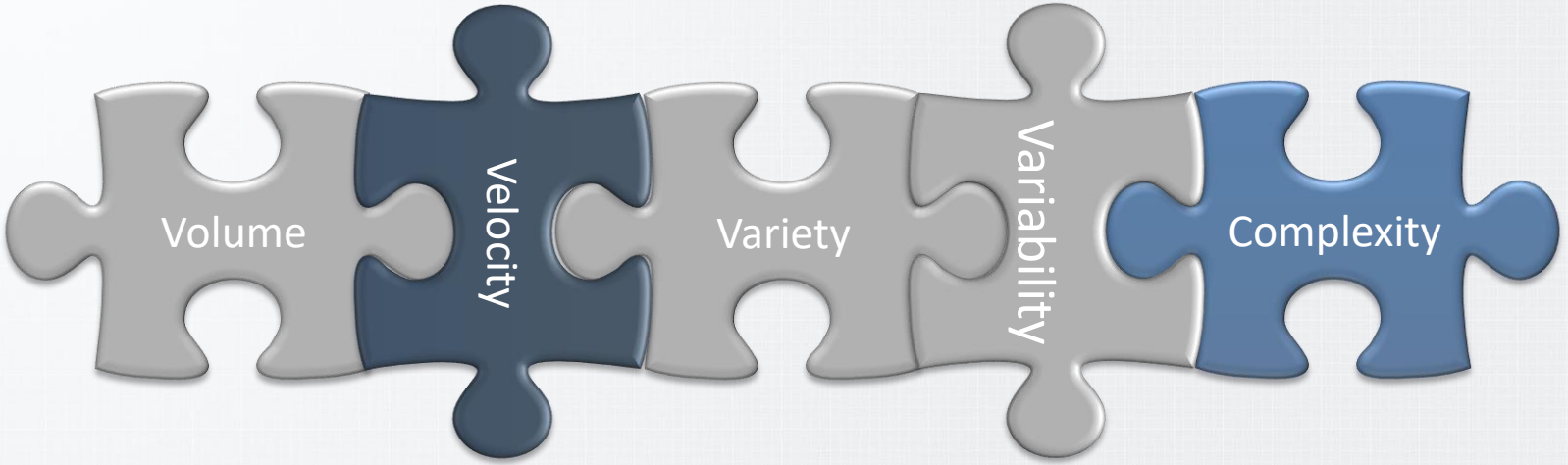
- Definition of data analytics and big data
- Benefits of data analytics including fraud prevention
- How to get started with data analytics
- Four steps of data analytics
- Tools, strategies and examples to help with data analytics
- Summary of important points

What is data analytics?

The scienceand artof discovering and analyzing patterns, identifying anomalies, and extracting other useful information in data through analysis, modeling, and visualization.

What is "Big Data?"

Extremely large data sets that may be analyzed computationally to reveal patterns, trends, and associations.



- 100% coverage
- Near real time
- All types of formats
- Inconsistent flow
- Difficult but not impossible

Sounds difficult… why tackle this?

- ✓ It's not as hard or expensive as you may think
- ✓ Add controls without compromising operational efficiency
- ✓ Detect hidden financial data inaccuracies (bigger issue than you think)
- ✓ Reduce the acceptable margin of error on estimates, judgements and models (getting as close to right)
- ✓ Data is underutilized
  - Gain greater insights
  - Add more value and unravel opportunities
  - Make better business decisions and develop strategic business moves
  - Transform your industry
  - Change from a reactive approach to a proactive approach

And of course, the reason we are all here!

FRAUD PREVENTION

- ✓ The perception of detection is an important deterrent to fraud
  - When unchecked for too long, many companies unknowingly foster workplaces susceptible to fraud
- ✓ Adding to your control environment without compromising operational efficiency
  - Internal control systems, while good, are not enough, and generally have weaknesses that can be exploited
    - Weak controls <> fraud but can foster an environment for fraud to succeed
    - Strong controls <> no fraud but can allow for difficulties in detection
  - Often with limited resources, small businesses are a ripe environment for employee misconduct
- ✓ Proactive detection
  - Deliberate search for misconduct close to the transaction date

All true but… Why now?

- ✓ There has been a technology revolution over the last 20 years
  - Advances/innovations in technology have been breaking boundaries and introducing new ways of working
  - Industries are transforming faster than ever

- ✓ Technological advances permit:
  - More frequent or continuous monitoring of transactions
  - Review of complete sets of data rather than just samples, offering a more comprehensive analysis
  - Users to see trends and patterns of activity that wouldn't have been visible with traditional methods

Sounds great… Let's get started!

CRITICAL THINKING IS CRUCIAL

- Computers are an incredible tool, but only a real person can gather, organize, apply and present the information in a meaningful way
- Striking a careful balance of data, technology, and human insight is critical in today's profession

CHANGE IS REQUIRED

- Legacy technologies and outdated processes must be relinquished

Start by asking some questions

What is it that you are looking for?

What are the business risks?

How are we performing and why?

What is driving performance?

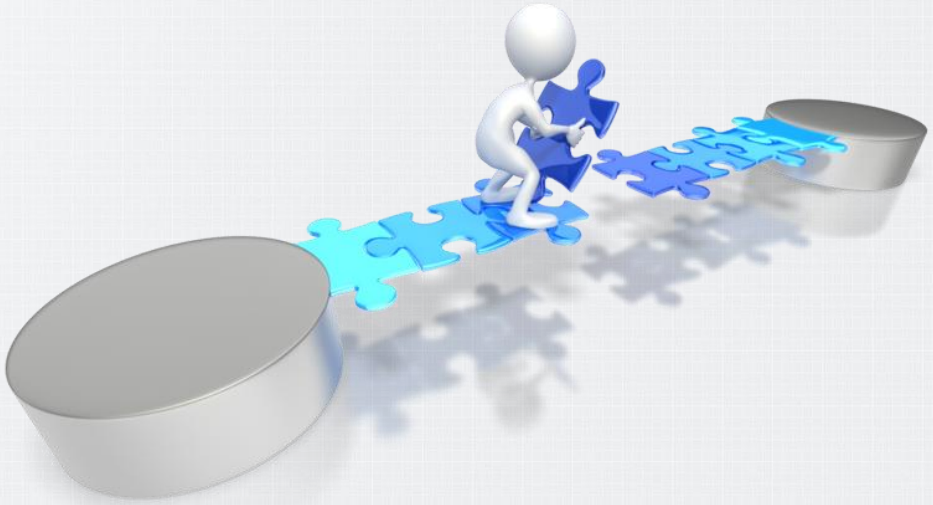
What ***should*** we be doing?

What do we want to look at?

<u>What are our concerns</u>?

What are the steps involved in data analysis?

1. Gather the data
2. Verify the data
3. Clean, join and review the data
4. Perform data analysis and visualizations



Step 1: Gather the Data

- ✓ Understand where it comes from
  - How can we trust what we are reading when we know nothing about the quality and source of the underlying data?
  - Test the source by making changes in the program and re-exporting the data or by verifying the input onscreen (many fields can look similar)
- ✓ Don't be afraid to use multiple resources
  - Management, IT, accounting personnel, etc. must work together to gather the data
- ✓ Don't be afraid to use multiple sources
  - Data can come from a variety of sources, such as general ledger, subledgers and programs used outside the financial information program (such as inventory or payroll)

Step 2: Verify the Data

- ✓ Verify data to ensure integrity, completeness and reliability
- ✓ Utilize data verification tools
  - Hashtag totals
  - Mathematical calculations such as totals, averages, etc.
  - Roll forward procedures
- ✓ Watch for dates
  - A variety of dates can be utilized by a system (posted date, transaction date, system date, invoice date, date sold, etc.)

Step 3: Clean, Join, and Review the Data

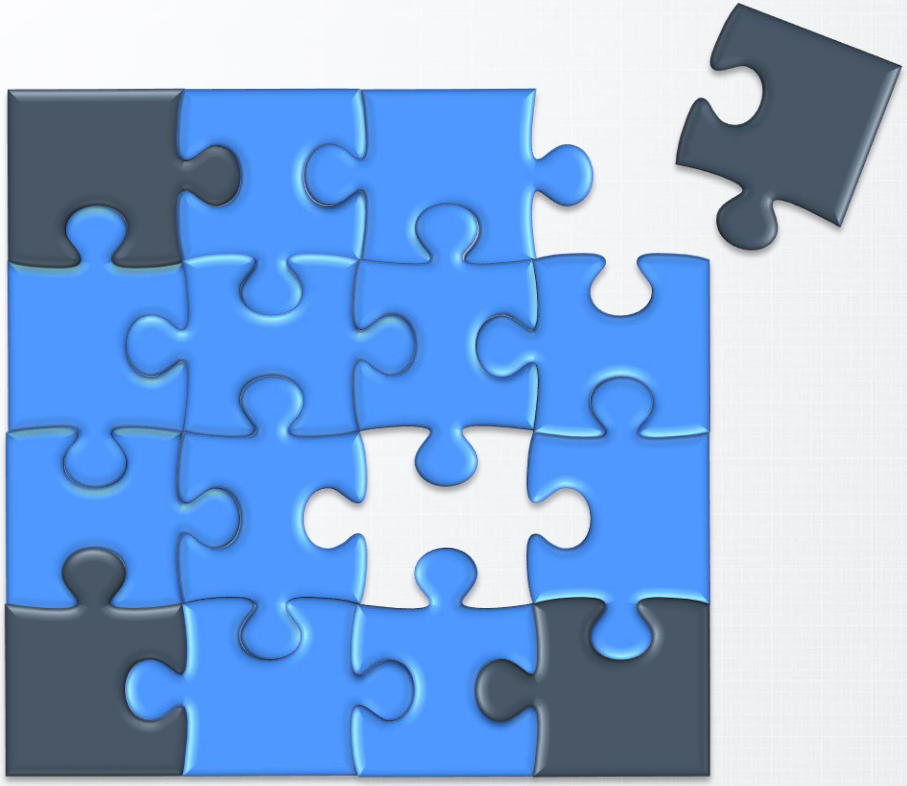
- ✓ Cleanse the data
  - Remove outliers, blanks, and formatting errors that can skew your results
  - Watch for data formats that can cause errors in your results (numbers recorded as a character, dates recorded as numbers, missing decimals or preceding zeros, etc.)
  - Watch for dates (yes, again)
- ✓ Join or append multiple sources of data together
  - Make sure that fields are the same field type (especially the join fields)
  - Utilize data manipulation tools such as ACL Analytics, CaseWare IDEA, Arbutus that:
    - Allow you to classify, stratify, and get statistics more easily and quickly than working in a spreadsheet program, and
    - Hold billions of rows of data whereas a spreadsheet typically limited
- ✓ Know and understand your data

Step 4: Perform data analysis and visualizations

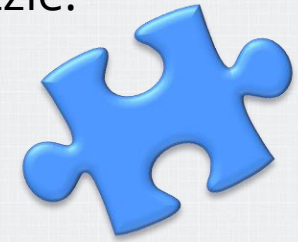
Goal

Not to have the most data but to make faster more effective business decisions

Tools, strategies and examples

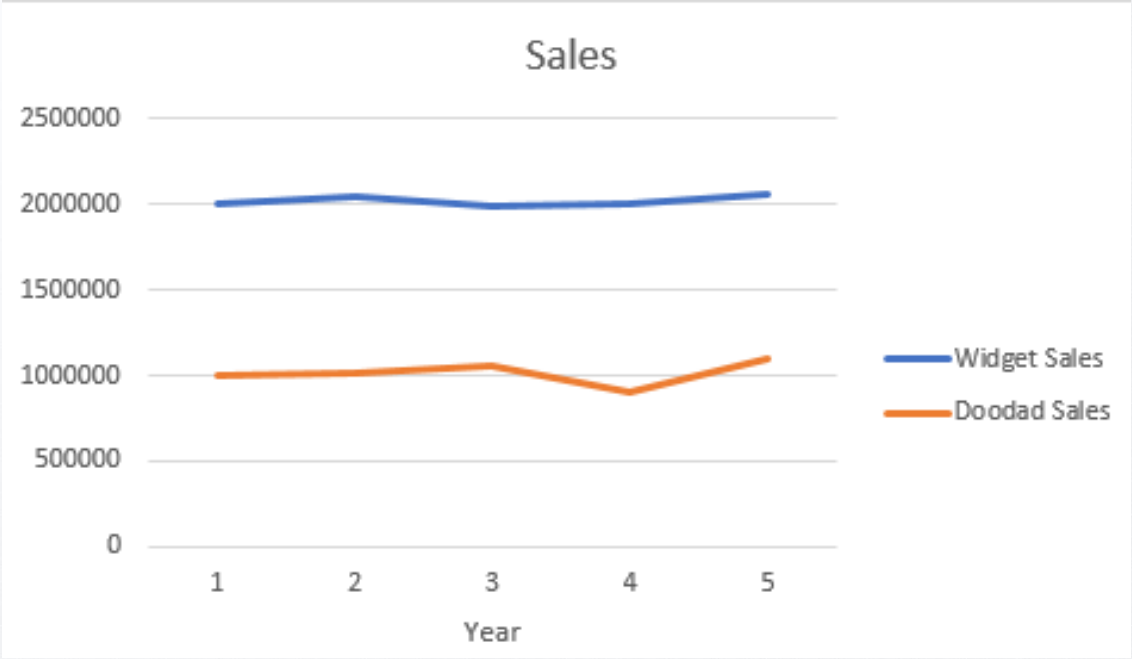


While there is no “one size fits all” analytical analysis and no failsafe step-by-step process to obtain answers to all your questions, there are tools and strategies that you can implement to help solve the puzzle.



Use different mathematical computations

Take data that you are currently analyzing and perform a variety of different computations related to that data

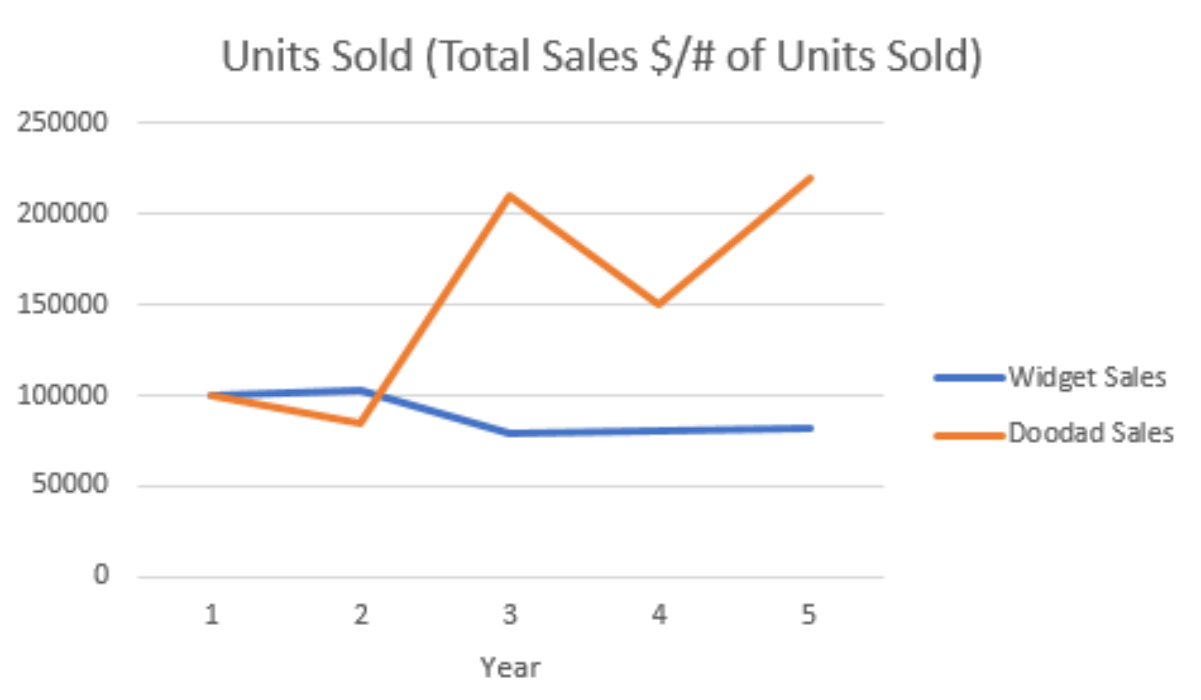


For example – Sales of widgets and doodads measured by total sales dollars ($2M and $1M sales this year, $1.95M and $1.02M last year, etc.)

Use different mathematical computations (cont'd)

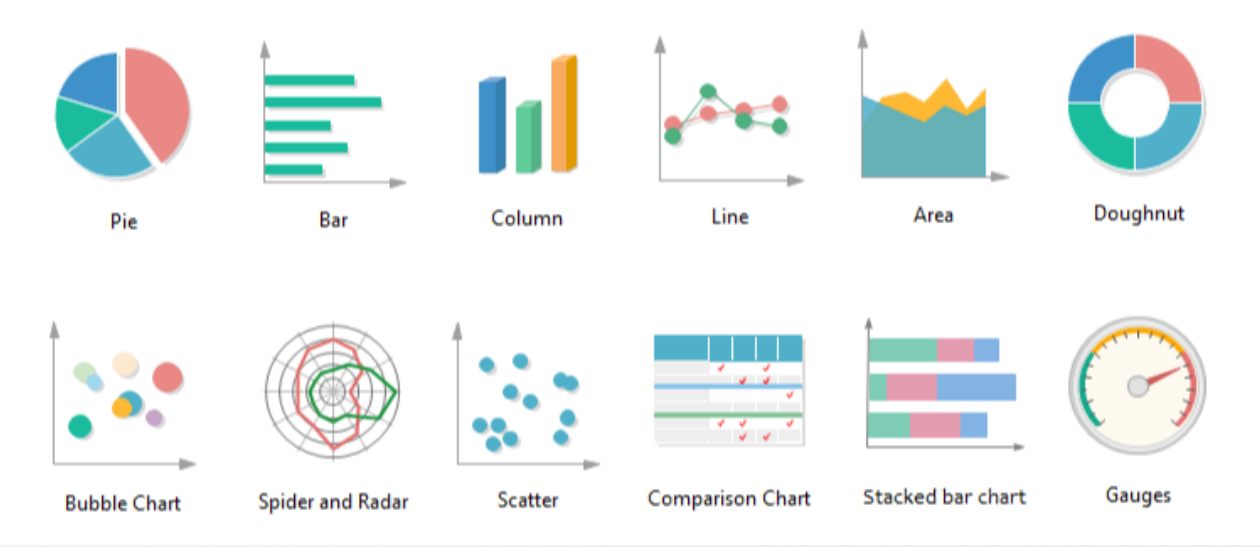
What if I told you the average Sales Price changed over the 5 years?

What if we looked at units sold rather sales dollars?

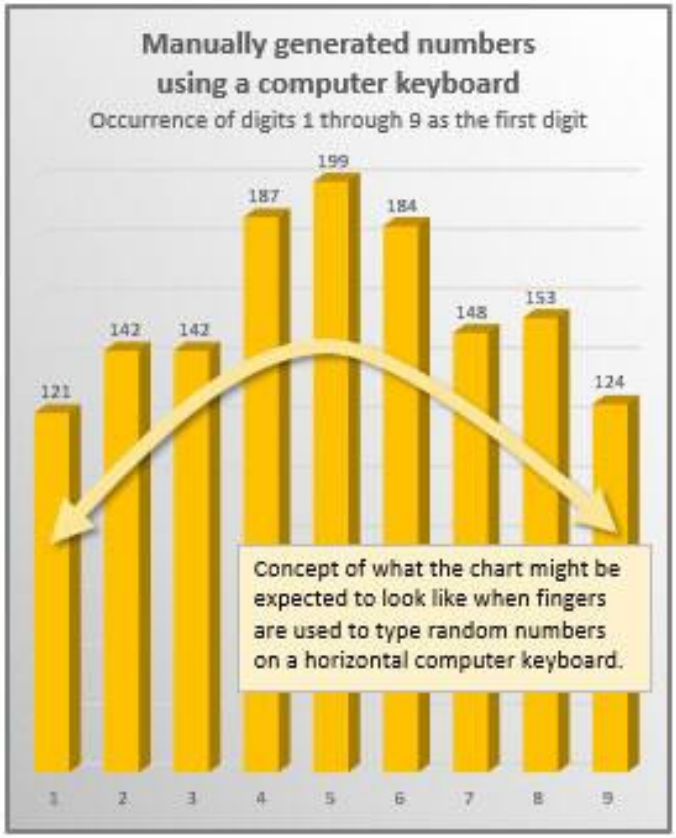


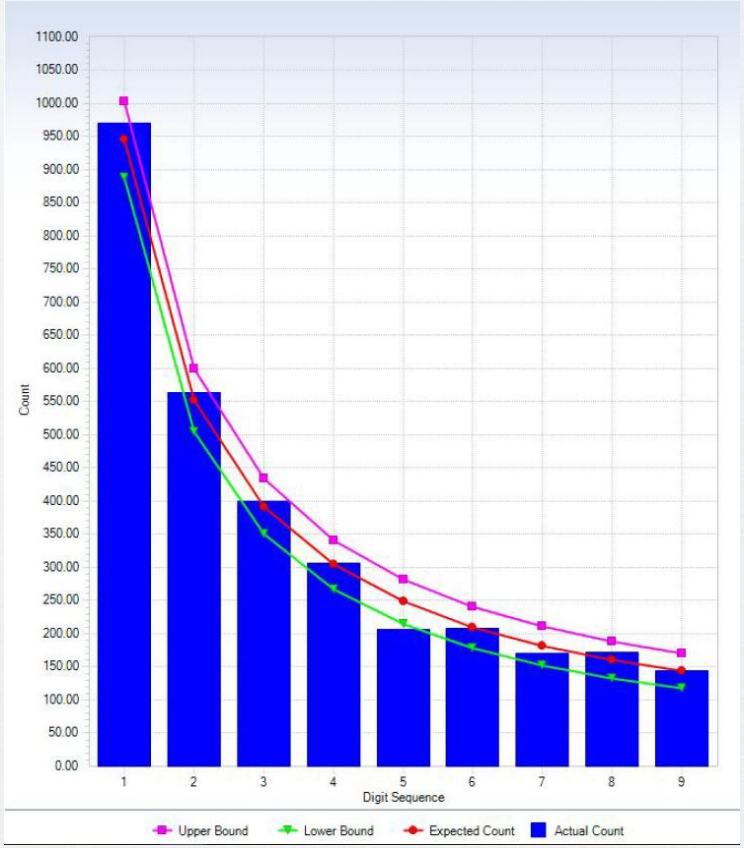
Use graphs, charts and other visual tools

- ✓ Seeing the information graphically makes it easier to understand
- ✓ Trends, patterns and abnormalities you may never have noticed will stand out



Use other statistical analysis

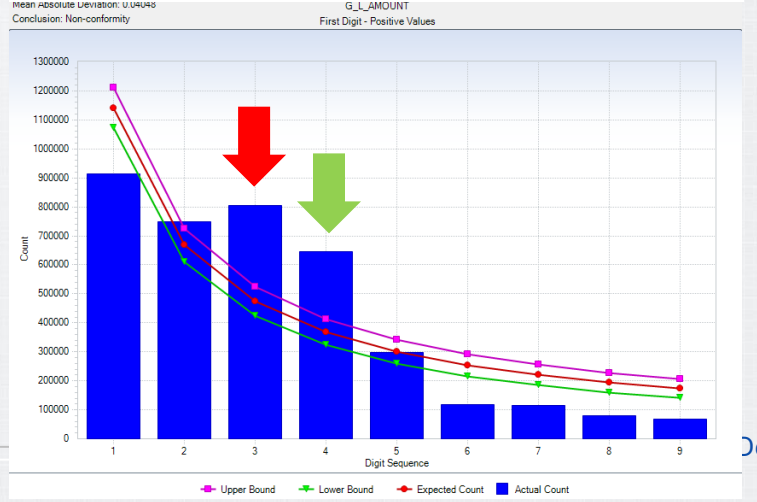




Benford's Law with Financial Data

Benford's Law works with random data sets and financial data is not random by its nature. So how can this test offer any insight?

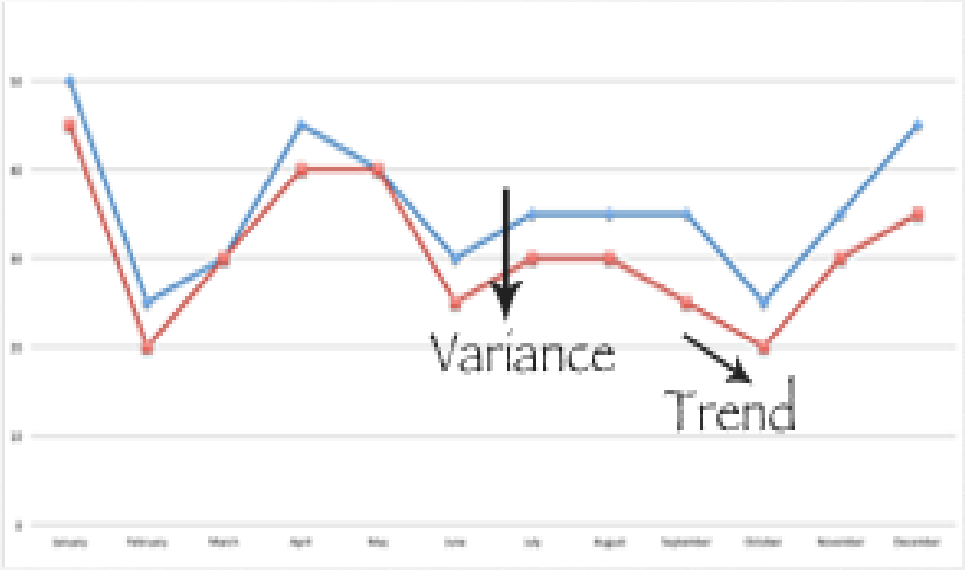
Benford's Law with Financial Data (cont'd)



Compare analysis year after year and watch for patterns or trends

Use historical data to find trends

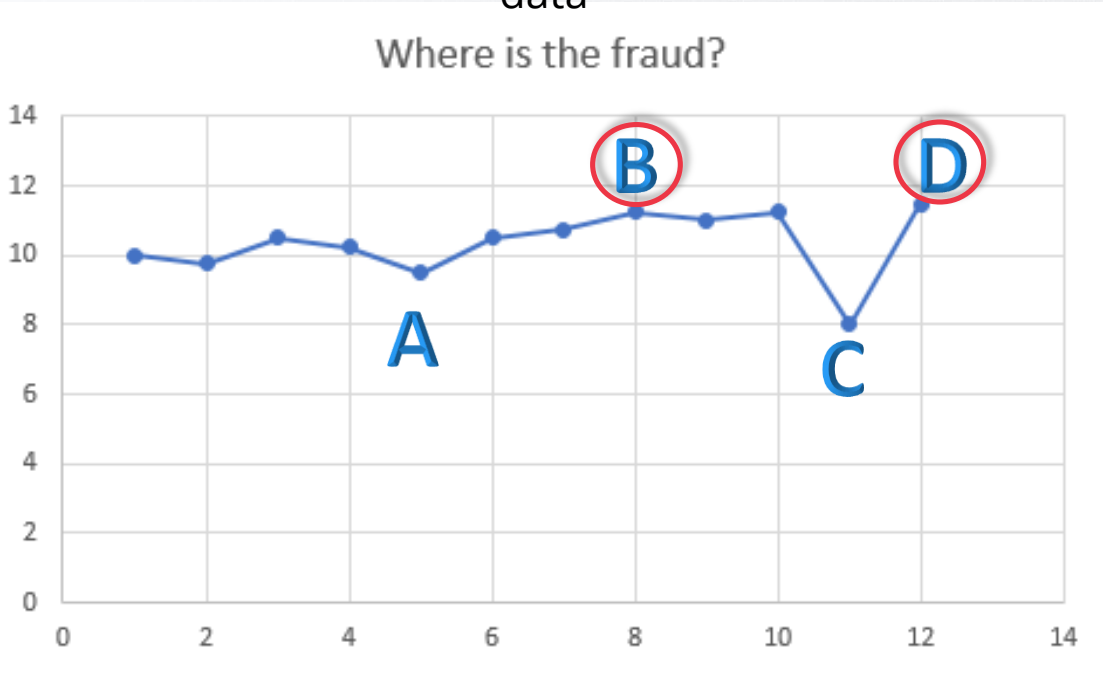
When viewing trends or patterns or trying to identifying abnormalities, there is no such thing as too much data (5 years is the industry norm)



Use historical data to find trends (cont'd)

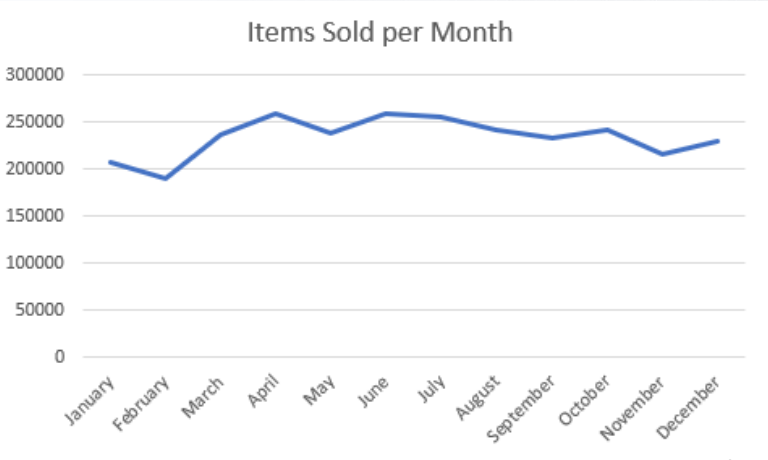
However be careful when analyzing patterns!

Consistency is not always our best friend – Sometimes the anomaly is the non-fraudulent data



Use nonfinancial data fields such as dates

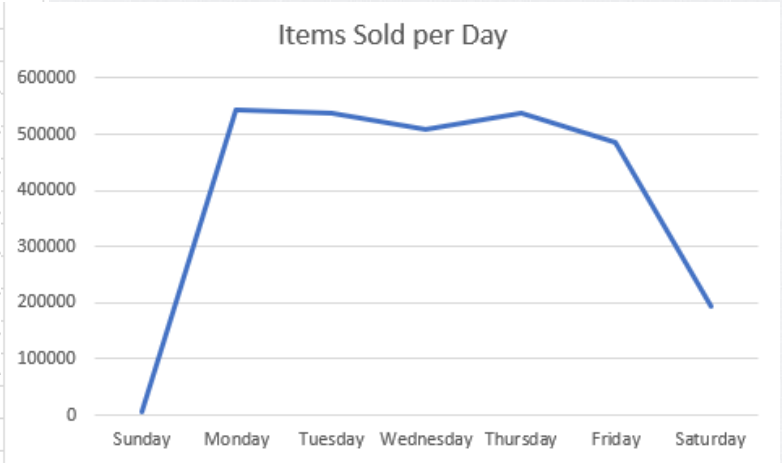
January	207317
February	190342
March	237379
April	259155
May	237870
June	259309
July	256478
August	241820
September	234034
October	242057
November	215869
December	229745



Using fields not typically used in an analytical analysis can offer valuable insight that cannot be detected with traditional methods/fields

Date fields are often underutilized but contain valuable information related to business trends and operational workflow

Sunday	4653
Monday	543595
Tuesday	537345
Wednesday	510045
Thursday	537233
Friday	485310
Saturday	193194



Dive into the details

Overall analysis works great for some things, but for others, a deeper dive into the details can identify anomalies not seen when viewing the big picture. Don't be afraid to dive in when something feels off.

For example:

- General journal entries (GJE) are posted throughout the year
- There is a higher rate of journal entries posted at period end
- Dismissing the analysis of GJE postings because these postings are not unusual may limit our results
- Further analysis detects that while more journal entries are made at period end, they are consistent in accounts affected, with the exception of certain items
- Even further analysis of these exceptions identifies transactions posted to accounts that do not normally get GJE's
- Anomalies may only be detected when drilling into the details several levels

	JOURNAL_SOURCE	ACCT_NO	NO_OF_RECS	AMOUNT_SUM
1	GJ	1001	11	-30,691,450.53
2	GJ	1003	11	7,634,311.39
3	GJ	1004	8	4,610,596.96
4	GJ	1301	3	-784,118.00
5	GJ	1520	1	-318,621.60
6	GJ	1620	1	318,621.60
7	GJ	1707	8	1,533,737.00
8	GJ	2001	11	14,266,360.37
9	GJ	3100	1	282,146.32
10	GJ	3101	1	-282,146.32
11	GJ	4015	3	754,310.00
12	GJ	8121	8	-1,533,737.00

SOURCE	DESCRIPTION
AP01102015	ACCOUNTS PAYABLE-TRADE

Use Analysis in Combination (Data Stacking)

Title	Name	# Entries	%	Transaction Types	Sundays	% Sunday	Remote Access?
A/R Clerk	B. Bunny	1,638	29%	A/R	360	22%	Yes
A/P Clerk	M. Mouse	1,742	31%	A/P	453	26%	Yes
Assistant Controller	H. Simpson	78	1%	AJE's / A/R	11	14%	Yes
CFO	D. Duck	6	0%	AJE's	4	67%	Yes
Warehouse	C. Brown	12	0%	Inventory AJE's	-	0%	No
Controller	P. Pig	24	0%	AJE's	14	58%	Yes
Admin	B. Boop	12	0%	Inventory AJE's	-	0%	No
A/R Asst Clerk	T. Devil	1,216	22%	A/R / A/P / AJE's	63	5%	No
A/P Asst Clerk	F. Flintstone	837	15%	A/P	-	0%	No
		5,565					

1 2 3 4

While the individual analysis of each data field may not be cause for concern, the totality of all the tests combined can be indicative of fraudulent activity

- Set criteria for red flags
- Give each criteria a weight
- Set limits for totals or averages
- Take a deeper look into those transactions flagged

Final thoughts…

- Technology cannot do the work for you
  - Human interaction is necessary and critical thinking is crucial
- Know what questions you have and know your data
- Measure what is important rather than make important what you measure
- In a data driven strategy there are always new questions and new metrics – it is a continuous loop that is always a work in process
- Tackle data analytics like you would a puzzle… one piece at a time
  - Start the process with the things you know
  - Analyze the picture that is forming
  - Add some different analytical analysis
  - See where the data take you

Solving the puzzle of data analytics

"It's important to remember that the primary value from big data comes not from the data in its raw form, but from the processing and analysis of it and the insights, products, and services that emerge from analysis. The sweeping changes in big data technologies and management approaches need to be accompanied by similarly dramatic shifts in how data supports decisions and product/service innovation."

Thomas H. Davenport in Big Data in Big Companies

Questions

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