Emerging Technologies in Accounting

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Technologies

+ Process Mining

+ Big Data Analysis (MADS)

+ Additional Big Data Management Techniques

+ "Intelligent" Accounting

Process Mining

+ Process mining is the mapping of a set of procedures and all possible steps and outcomes for the purpose of discovering the sequence of events that are involved in a process.

+ Creation of a "flow chart" of events that constitute a process.

+ Used to discover the planned and actual sets of events that make up a business process.

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Process Map

+ A process map is the actual sequence of events as they are suppose to occur within a business process.

+ The process map is constructed using the listed company protocol along with anecdotal evidence from management.

+ The process map represents the "ideal" versions of events that could occur within a process.

+ Events are represented by boxes.

+ The direction of the process is represented by interlinking these boxes with arrows.
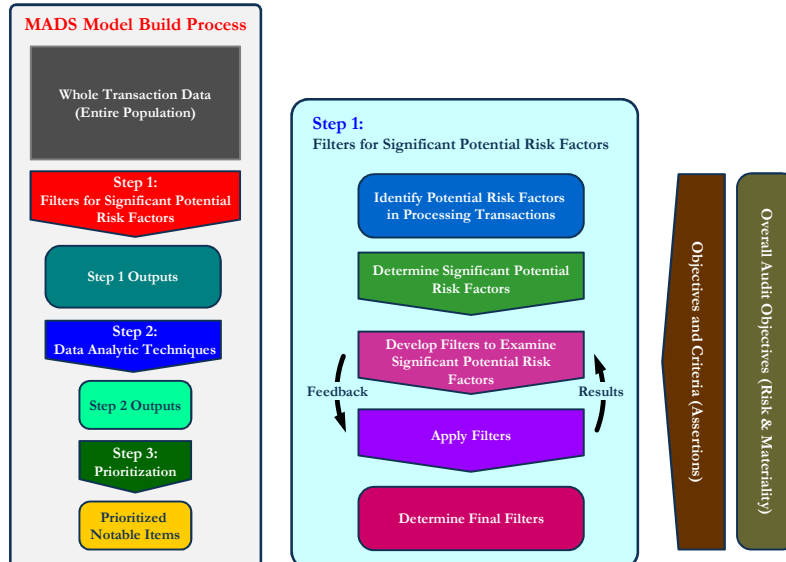
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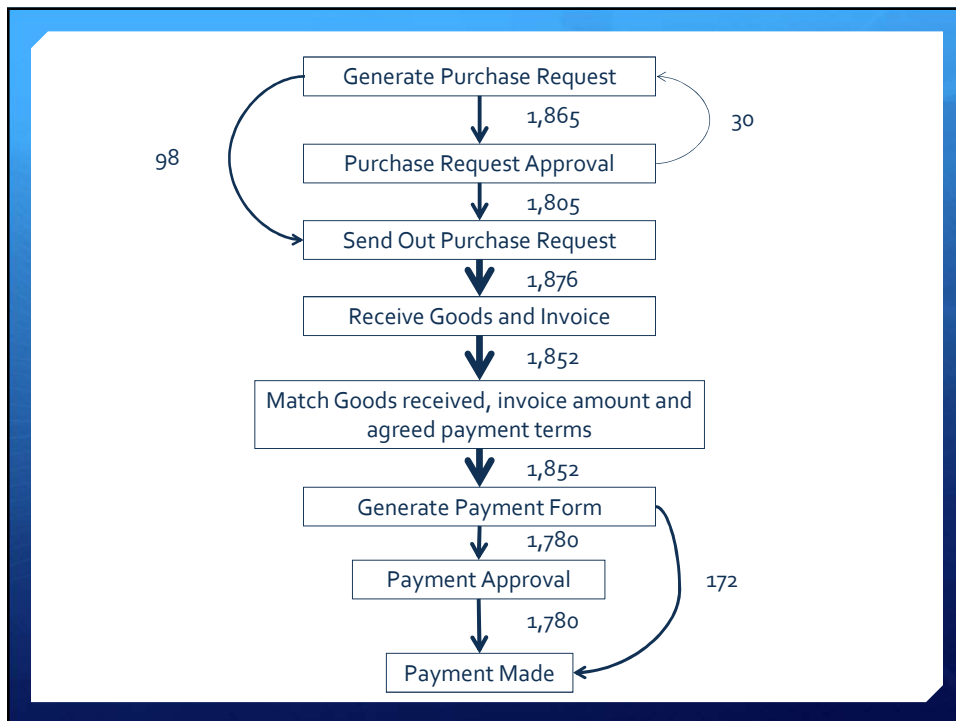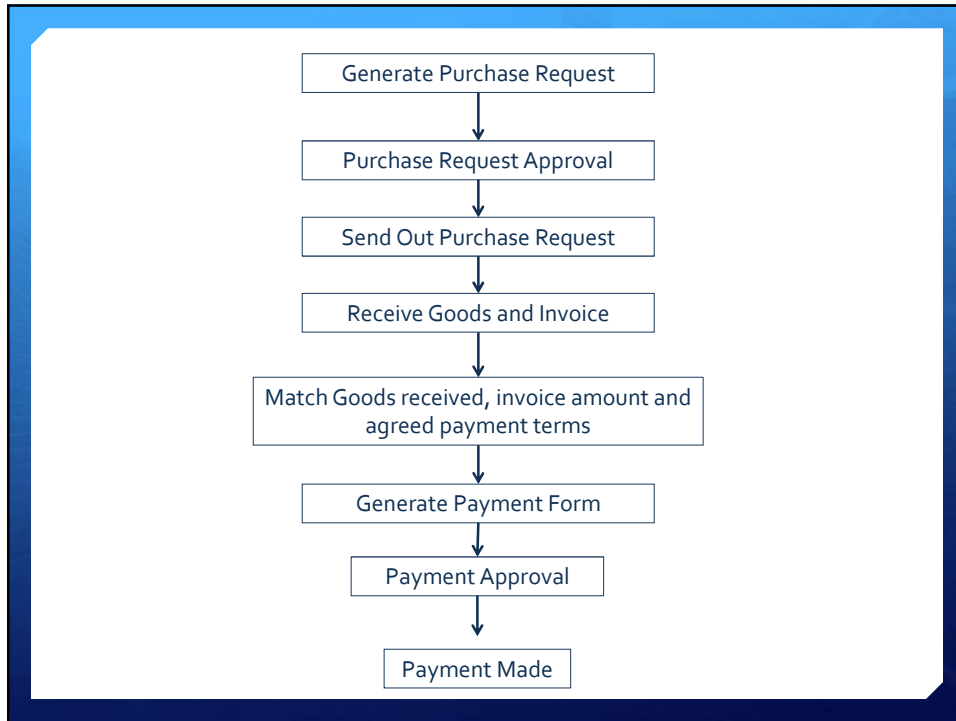
Audit Applications

+ Process mining can be used to determine the types of documentation involved in a business process.

+ Auditors can use these to identify what areas to focus on with respect to various business functions.

+ By using completed process maps auditors can discover:
  + Relevant controls
  + Circumnavigation of such controls.
  + Process anomalies
  + Frequency of abnormal processes.

+ Process mining tells an auditor two main things
  1. What the business process should look like.
  2. How the business process is conducted in practice.

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MADS

+ Multidimensional Audit Data Selection

+ MADS is one approach to handling large data analysis issues for auditors.

+ Traditionally auditors approach the audit by selecting a sample and analyzing the sample for adequacy.

+ This may result in many issues going undetected.

+ The MADS process applies filters to the whole population to limit the selection of data being tested.

+ Once the population has been filtered analytics are applied to determine outliers.

+ These outliers are prioritized for examination by auditors.

+ This method makes it more likely that problematic data is detected.

MADS Framework

MADS Model Build Process

- Whole Transaction Data (Entire Population)
- Step 1: Filters for Significant Potential Risk Factors
- Step 1 Outputs
- Step 2: Data Analytic Techniques
- Step 2 Outputs
- Step 3: Prioritization
- Prioritized Notable Items

Step 1:
Filters for Significant Potential Risk Factors

- Identify Potential Risk Factors in Processing Transactions
- Determine Significant Potential Risk Factors
- Develop Filters to Examine Significant Potential Risk Factors
- Apply Filters
- Determine Final Filters

Feedback | Results

Objectives and Criteria (Assertions)

Overall Audit Objectives (Risk & Materiality)

General Ledger Auditing

- + General Ledgers pose a huge problem to auditors since they contain billions of records making systematic auditing an issue.

- + Auditing standards specifically require auditors to examine journal entries for fraud.

- + We are developing several new techniques to detect fraudulent activities.

GL Big Data Techniques

+ Clustering is primarily used to determine outliers in irregular data sets.
    + Used to determine behavioral patterns.
    + Can be applied to detect deviations from expected behaviors.

+ Text mining is also being applied to comment fields to determine irregular variations, or behaviors on the part of preparers.

+ These techniques are combined with social network mapping to determine potential collusion that may violate internal controls.

"Intelligent" Accounting

+ Intelligent accounting and auditing incorporates the use of machine learning algorithms and expert systems to aid accountants in detecting issues and preparing documents.

+ Neural networks can be used to predict risky and fraudulent accounts.

+ Expert systems can be used to recommend auditor or accounting procedures.

Neural Networks
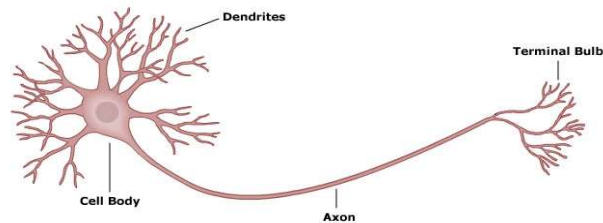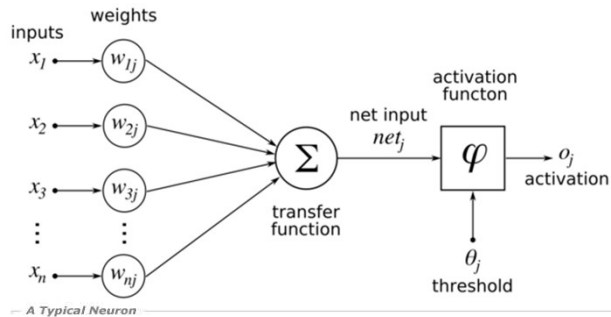
Neural Networks

+ Originally formalized in the 1940's the idea of machine run neural networks for deep learning primarily took off in the 1980's.

+ Neural Networks are capable of coming up with classifications or solutions to problems based on the hidden layers of rules that are established.

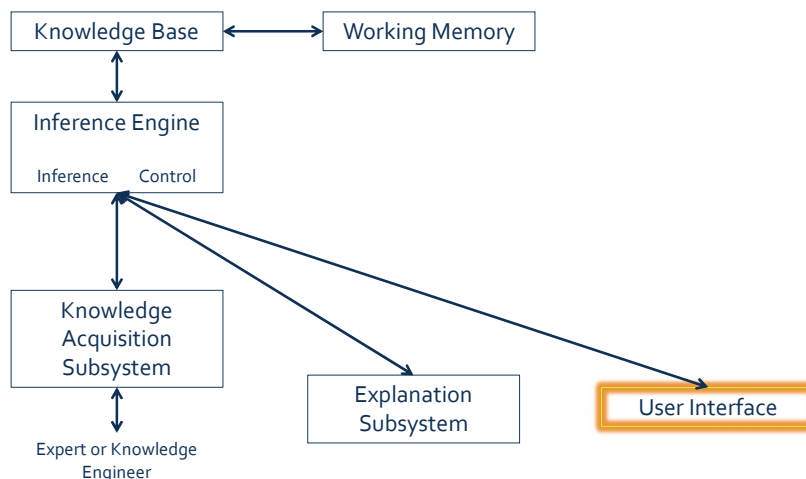+ Most neural networks are capable of adjusting weighting schemes to improve prediction models.

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Input Layer   Hidden Layer   Output Layer
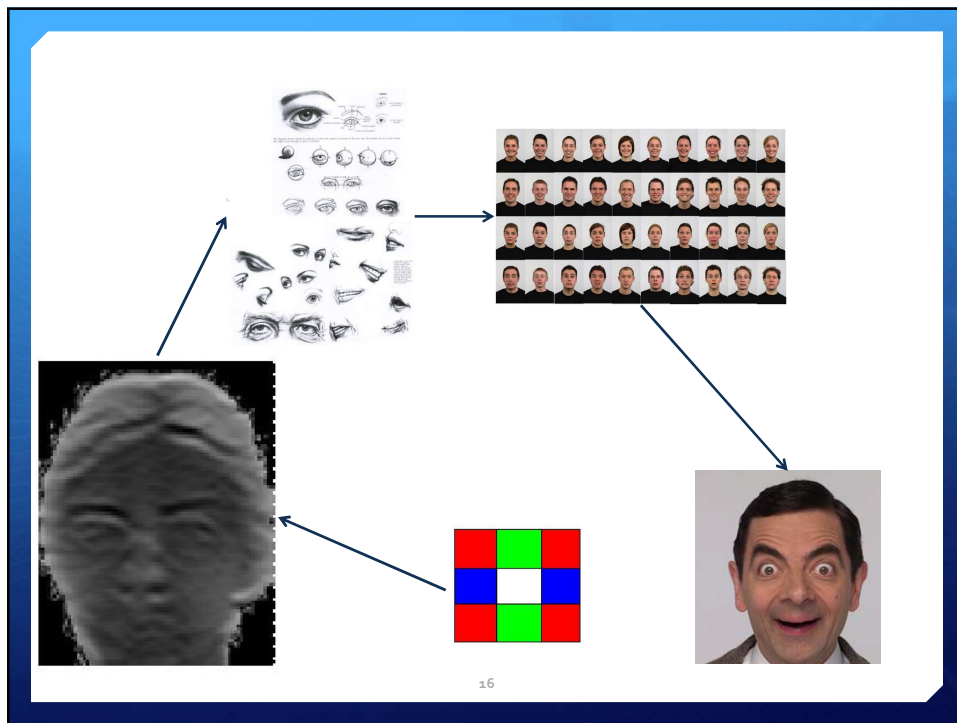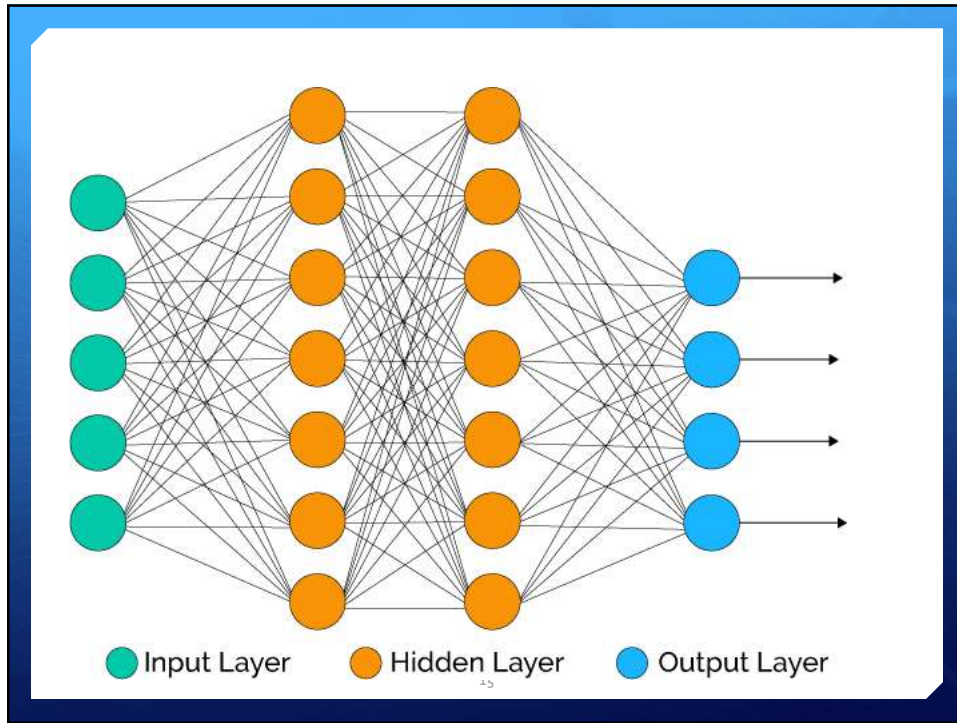
Expert Systems

+ An expert system is a computer program designed to aid decision makers.

+ An expert system draws on a knowledge base developed from experts within a field.

+ Expert knowledge is reformulated into a set of rules.

+ These rules are applied to a data set in order to gain an expert level of analysis by those that are less experienced.

+ The idea is to "share" expert knowledge and experiences in a program to aid those with less knowledge and experience.

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Expert System Outline

| Knowledge Base | → | Working Memory |

Inference Engine

Inference   Control

Knowledge Acquisition Subsystem

Explanation Subsystem

User Interface

Expert or Knowledge Engineer

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AI in Auditing

- Two main areas of concern
  - Auditing intelligent systems
  - Using intelligent auditing tools

- Intelligent systems are not yet prevalent

- Expert Systems (ES) are becoming increasingly used and incorporated into the traditional environment.

- Tool development increases application risks.

- Slowly starting to penetrate into internal audits.

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Questions?

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