

Determining Best Technique for Different Applications

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DSC/510: DATA SCIENCE

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Training of New Employees

Bayesian Networks:
Personalize training paths
based on employee
responses and progress.

Neural Networks: Adapt to
different learning styles
and predict areas needing
improvement.

Justification: Supports
smarter, adaptive learning
systems (Boateng et al.,
2020).

Training System Notes

Bayesian Networks adjust learning paths based on employee progress and responses.

Neural Networks identify areas for improvement and adapt to learning styles.

Integration enhances effectiveness of employee development programs.

Handwriting Recognition

Convolutional Neural Networks (CNNs):
Recognize shapes and patterns in
handwritten text.

Support Vector Machines (SVMs):
Effective for clean, structured
handwriting classification.

Justification: CNNs excel in digit and
character recognition accuracy
(GeeksforGeeks, 2025; Hamid et al.,
2017).

Handwriting Recognition Notes



CNNs ideal for digit and character recognition.



SVMs excel in classifying structured handwriting.



Combined use improves accuracy and efficiency of handwriting analysis systems.

Price Lookup Subsystem for a High-Volume Merchandise Seller

- ▶ Clustering: Groups products by similar sales patterns, price sensitivity, and seasonal demand.
- ▶ Example: Detect 'fast movers' vs. 'slow movers' to adjust pricing rules or promotions.
- ▶ Impact: Improves targeted discounts, cross-selling, and inventory management.



Predictive Modeling for Price Lookup



Impact: Maximizes revenue, reduces stockouts, and prevents markdowns.

Forecast demand for each product to support dynamic pricing.



Example (Nordstrom): Predict seasonal spikes in demand for designer coats based on sales, weather, promotions, and browsing trends.

Automated Voice Inquiry Processing System

Clustering: Groups similar inquiry types from call data to streamline responses.

Example: In police dispatch, cluster 'suspicious vehicle' and 'blocking driveway' calls into non-emergency category.

Impact: Reduces dispatcher workload and improves urgent response times.

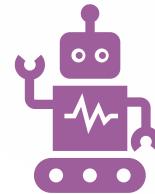
Predictive Modeling for Voice Inquiry



Anticipates call urgency and required resources based on call patterns and location.



Example: Predict if a call is an emergency early, triggering immediate dispatcher action.



Impact: Enables faster triage and optimal law enforcement resource deployment.

Diagnosis of a Well-Established but Complex Disease

▶ Neural Networks

- ▶ **Strength:** Excellent for complex pattern recognition across multiple data types.
- ▶ **Application:**
 - ▶ Analyze lab results, medical imaging (X-rays, MRIs), and patient records.
 - ▶ Detect subtle abnormalities in imaging results that may be missed by the human eye.

▶ Support Vector Machines (SVM)

- ▶ **Strength:** Highly effective for classification tasks.
- ▶ **Application:**
 - ▶ Classify patient data using histories, lab results, and symptoms.
 - ▶ Group disease identifiers into categories to aid in diagnosis.
 - ▶ Assign patients into different “risk” classes for treatment prioritization.

References

Reference

- ▶ Boateng, F., Boateng, S. L., & Amoako, G. K. (2020). Artificial intelligence and machine learning in employee training: A conceptual framework. *Journal of Human Resource and Sustainability Development*, 8(2), 123–135. <https://doi.org/10.4236/jhrss.2020.82009>
- ▶ GeeksforGeeks. (2025). Handwriting recognition using convolutional neural networks. <https://www.geeksforgeeks.org/handwriting-recognition-using-convolutional-neural-networks/>
- ▶ Hamid, M. R. A., Sami, W., & Sidek, M. H. M. (2017). Discriminant validity assessment: Use of Fornell & Larcker criterion versus HTMT criterion. *Journal of Physics: Conference Series*, 890(1), 012163. <https://doi.org/10.1088/1742-6596/890/1/012163>