

**Dennis Connolly**  
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**Summary** Twenty years of experience in Computer Science and Software Engineering with an emphasis on Artificial Intelligence and Advanced Technology. Track record of innovation and well engineered solutions to complex problems in fields ranging from advanced research to commercial software development.

**Languages** Java, JSP, XML, Web Services, C++, Perl, Visual Basic, JDBC, COM, ASP, ADO.

**Experience** **Intelligent Systems, Wheaton, IL** **1997 to Present**

*Principal*

Formed company specializing in intelligent software solutions including Content Management, Data Mining, financial modeling, and custom Java and XML solutions.

- Designed proprietary data mining technology for analyzing large text-based databases. This technology performs statistical analysis of word content to extract prominent patterns within thousands of text comments. The technology is incorporated into a Java-based analysis tool providing both GUI client and JSP-based web interface. Also developed platform-independent repository access API based upon Web Services technologies.

- Developed AI and other technologies for Content Management & Enterprise Portal project for large CMS consulting firm. A key requirement of this project was to migrate legacy content (10,000+ pages) to component-based CMS architecture.

- Developed Pattern Recognition tools for automatic extraction of legacy content.
- Constructed JSP-based content authoring and migration tools.
- Developed tools for automatic discovery and translation of links, images, and formatting information within legacy content.

The various elements of this project involved extensive use of Java/XML technologies including DOM, SAX, XSLT, and JAX.

- Was AI expert for large Content Management initiative within major telecommunications company. Highlights of contributions to this project include:
  - Developed intelligent search technology for document repository.
  - Developed automatic indexing and classification tool for repository based upon statistical clustering.
  - Developed statistical techniques to automatically extract semantically rich meta-data from documents.
  - Created tools based upon pattern recognition to automatically convert unformatted legacy documents into structured XML and HTML documents.
  - Developed techniques to automatically extract synonyms, abbreviations, and domain-specific terminology from document repository.

These technologies and tools were implemented in Java. The search engine was encapsulated as COM objects. Participated in many facets of the development effort including XML design (e.g. DTD's) and data modeling.

- Developed Data Mining software for major Telecommunications Company. This tool employs techniques from AI and statistics to discover hidden business knowledge from unstructured text. This has been used to discover key trends in high value business data including comment data collected at call centers, Internet feedback, and free-text responses within survey data. A patent has been filed on the underlying technology. This technology is implemented in Java and employs a three-tier client-server architecture using ASP, COM, and ADO. Also implemented version based on CORBA architecture.
- Developed a variety of custom solutions for clients, primarily involving Java and XML.
- Active research program has resulted in a variety of proprietary software products.

- A key research area is the modeling of financial markets using techniques from Artificial Intelligence and statistics and development of proprietary trading systems.

**Ameritech**, Hoffman Estates, IL  
*Member of Technical Staff*

**1994 to 1997**

Conducted applied research and technology planning, specializing in the application of Artificial Intelligence and advanced technologies to the Internet, telecommunications, and interactive television.

- Investigated the application of AI and intelligent agent technology within the telecommunications industry. Developed new technologies and product ideas, and oversaw research conducted by vendors such as Bellcore. Developed software demonstrating the commercial and technical feasibility of these ideas. Defined strategic vision for this technology within Ameritech and represented the company at relevant standards bodies.
- Invented Intelligent Text Entry mechanism allowing text messages to be entered using a telephone keypad. This technique employs a statistical model to predict letters based upon previously typed text. Two patents have been granted for this invention.
- Was member of the original team that initiated and launched Ameritech's Internet service (Ameritech.Net) and served as subject matter expert on AI, agent technology, and search engines for this effort. Evaluated and recommended enabling technologies and vendors and developed custom technologies. Also developed early internal Internet applications and participated in the development of external sites such as the '96 Democratic National Convention site.
- Designed and developed multimedia applications for interactive television including video-on-demand, electronic program guides, and home shopping. Conducted research on the use of intelligent agent technology to enhance the viewing experience.
- As member of the Human Factors group, designed intelligent interfaces, developed usability prototypes, and participated in new product design.
- The software developed during this time period was primarily implemented in Java, but also included other tools such as Perl, Visual Basic, and Director.

**The MITRE Corporation**, Bedford, MA  
*Member of Technical Staff*

**1990 to 1994**

Conducted research in Artificial Intelligence, with emphasis in Machine Learning, Neural Networks, and Natural Language Processing (NLP). Served as the Machine Learning specialist on NLP project. Primary role was the investigation of techniques from Machine Learning and Statistical NLP to extend capabilities of Natural Language Understanding systems.

- Invented Machine Learning technique for constructing Bayesian networks from empirical data. A major feature of this approach is the use of conceptual clustering to construct hidden (latent) variables in the model. These ideas have been implemented in a system called Tantra. This research was presented at a plenary session of the Tenth International Conference on Machine Learning (ML93).
- Derived new learning algorithm analogous to neural network back-propagation for training weights in Bayesian networks via gradient descent.
- Conducted research into the application of Machine Learning to the resolution of anaphoric reference (e.g., resolving pronouns). This involved experimentation with a variety of classifiers and probabilistic models, including neural networks, decision trees, Bayesian classifiers, and Bayesian networks. This research has led to the development of novel learning techniques designed to address problems characterized by high dimensionality, sparse data, and violated independence assumptions.
- Developed new neural network training algorithm designed to address problems characterized by high dimensionality and sparse data. This approach involves application of back-propagation to subspaces of the original higher dimensional space.
- Investigated the learning of natural language grammars using hill climbing approach. Have also constructed algorithms for the induction of finite-state automata and investigated statistical and information theoretic techniques for discovering word classes and phrase structure from data.
- Member of development team for the Alembic language understanding system which is designed for extraction and retrieval of information from free text (e.g. newspapers).
- Designed email filter which classifies mail based upon the statistical properties of message content.

- Designed architecture combining Case-based Reasoning (CBR) and inductive learning. This technique uses conceptual clustering to organize the case memory and learning-by-examples to learn the CBR adaptation rules represented using version spaces. New features are induced as a by-product of the conceptual clustering.
- Designed probabilistic algorithm for learning new features in CBR system. Implemented case memory for this system based on the COBWEB clustering algorithm.
- As member of Neural Network project, performed research on modular networks, transfer of learning, and abstraction in the Cascade Correlation architecture.

**Wang Laboratories, Lowell, MA**

**1983 to 1989**

*Software Engineer*

Developed commercial Artificial Intelligence software, conducted Artificial Intelligence research, and performed compiler development.

- Was responsible for researching new and advanced AI technologies for Wang. Initiated several projects and new product ideas, including Forms Recognition Project in which neural network, pattern recognition, and image processing technology is used to classify digital images of business forms.
- Was member of development team for COMMON Knowledge, a commercially available expert system shell.
- Ported COMMON Knowledge expert system shell to Wang VS mini-computer.
- Was responsible for Wang's Lisp and Basic compilers.
- Ported Kyoto Common Lisp from UNIX to Wang VS mini-computer.
- Developed source code translator and terminal emulator.

**Santa Fe Industries, Chicago, IL**

**1983**

Developed business software, including a financial spreadsheet tool.

**Argonne National Laboratory, Chicago, IL**

**1982**

Participated in research in elementary particle physics.

**Education** Loyola University Chicago, IL  
B.S. in Physics 1982

**Publications** Connolly, D., Burger, J., Day, D., "A Machine Learning Approach to Anaphoric Reference," International Conference on New Methods in Language Processing, 1994.

Connolly, D., "Constructing Hidden Variables in Bayesian Networks via Conceptual Clustering," Machine Learning: Proceedings of the Tenth International Conference, 1993. (selected for plenary session)

Burger, J., Connolly, D., "Probabilistic Resolution of Anaphoric Reference," AAAI Fall Symposium: Probabilistic Approaches to Natural Language, 1992.

Connolly, D., Christey, S., Koton, P., McAlpin, S., Mulvehill, A., "Learning Representation by Integrating Case-based and Inductive Learning," AAAI- 93 Workshop on Case-Based Reasoning, , 1993.

Aberdeen, J., Burger, J., Connolly, D., Roberts, S., Vilain, M., "Description of the ALEMBIC System as Used for MUC-5" Fifth Message Understanding Conference, 1993.

Aberdeen, J., Burger, J., Connolly, D., Roberts, S., Vilain, M., "Description of the ALEMBIC System as Used for MUC-4" Fourth Message Understanding Conference, 1992.

Aberdeen, J., Burger, J., Connolly, D., Roberts, S., Vilain, M., "ALEMBIC: MUC-4 Test Results and Analysis" Fourth Message Understanding Conference, 1992.

Smotroff, I., Friedman, D., Connolly, D., "Self Organizing Modular Networks"  
Proceedings of the International Joint Conference on Neural Networks, 1991.

Smotroff, I., Friedman, D., Connolly, D., "Large Scale Networks Via Self Organizing  
Hierarchical Networks" Applications of Artificial Neural Networks II, 1991.