The material in this preliminary edition, which represents the first two volumes of the Handbook, will be published this winter. Below is a list of the major sections of each volume, followed by an outline indicating all of the articles now planned.

I. Introduction
   Search
   AI Programming Languages
   Representation of Knowledge
   Natural Language Understanding
   Speech Understanding

II. Applications-oriented AI Research -- Part 1
    Applications-oriented AI Research -- Part 2: Medicine
    Applications-oriented AI Research -- Part 3: Chemistry
    Applications-oriented AI Research -- Part 4: Education
    Automatic Programming

III. Theorem Proving
     Vision
     Robotics
     Information Processing Psychology
     Learning and Inductive Inference
     Planning and Problem-Solving Techniques
Introduction

A. The AI Handbook (intent, audience, style, use, outline)
B. Overview of AI
C. History of AI
D. An Introduction to the AI Literature

Search

A. Overview
B. Problem representation
   1. State-space representation
   2. Problem-reduction representation
   3. Game trees
C. Search Methods
   1. Blind state-space search
   2. Blind AND/OR graph search
   3. Heuristic search in problem-solving
      a. Basic concepts in Heuristic Search
      b. A*: optimal search for an optimal solution
      c. Relaxing the optimality requirement
      d. Bidirectional search
   4. Heuristic search of an AND/OR graph
   5. Game tree search
      a. Minimax
      b. Alpha-beta
      c. Heuristics in Game Tree Search
D. Example Search Programs
   1. Logic Theorist
   2. General Problem Solver
   3. Gelernter's geometry theorem-proving machine
   4. Symbolic Integration Programs
   5. STRIPS
   6. ABSTRIPS

AI Programming Languages

A. Historical Overview of AI Languages
B. AI Language Features
   1. Overview of Language Features
   2. Data Structures
   3. Control Structures
   4. Pattern Matching
   5. Environment
C. Example AI Programming Languages
   1. LISP
   2. PLANNER and CONNIKER
   3. QLISP
   4. SAIL
   5. POP-2
Representation of Knowledge

A. Issues and problems in representation theory
B. Survey of representation techniques
C. Representation Schemes
   1. Logic
   2. Semantic nets
   3. Production systems
   4. Procedural representations
   5. Semantic primitives
   6. Direct (Analogical) representations
   7. Higher Level Knowledge Structures

Natural Language Understanding

A. Overview - History & Issues
B. Grammars
   1. Review of formal grammars
   2. Transformational grammars
   3. Systemic grammars
   4. Case Grammars
C. Parsing techniques
   1. Overview of parsing techniques
   2. Augmented transition nets, Woods
   3. CHARTS - GSP
D. Text Generation
E. Machine Translation
   1. Overview & history
   2. Wilks' machine translation work
F. Natural Language Processing Systems
   1. Early NL systems
   2. PARRY
   3. MARGIE
   4. LUNAR
   5. SHRDLU
   6. SAM and PAM

Speech Understanding Systems

A. Overview
B. Some early ARPA speech systems
   1. DRAGON
   2. HEARSAY I
   3. SPEECHLIS
C. Recent Speech Systems
   1. HARPY
   2. HEARSAY II
   3. HWIM
   4. SRI-SDC System
Applications-oriented AI Research -- Part 1
A. Overview of Applications-oriented AI Research
B. TEIRESIAS - Issues in Expert Systems Design
C. Mathematics
  1. MACSYMA
  2. AM
D. Miscellaneous Applications Research
  1. SRI Comp. Based Consultant
  2. PROSPECTOR
  3. RITA
  4. AI Applications in Information Retrieval

Applications-oriented AI Research -- Part 2: Medicine
A. Overview of Medical Applications Research
B. MYCIN
C. CASNET
D. INTERNIST
E. Present Illness Program (PIP)
F. Digitalis Advisor
G. IRIS

Applications-oriented AI Research -- Part 3: Chemistry
A. Overview of Applications in Chemistry
B. Applications in Chemical Analysis
C. The DENDRAL Programs
  1. DENDRAL
  2. CONGEN and its extensions
  3. Meta-DENDRAL
D. CRYSALIS
E. Applications in Organic Synthesis

Applications-oriented AI Research -- Part 4: Education
A. Historical Overview of AI Research in Educational Applications
B. Issues and Components of Intelligent CAI Systems
C. ICAl Systems
  1. SCHOLAR
  2. WHY
  3. SOPHIE
  4. WEST
  5. WUMPUS
  6. BUGGY
  7. EXCHECK

Automatic Programming
A. Automatic Programming Overview
B. Techniques for Program Specification
C. Approaches to AP
D. AP Systems
  1. PSI
  2. SAFE
  3. Programmer's Apprentice
  4. PECOS
  5. DAEDALUS
  6. PROTO SYSTEM-1
  7. Heidorn's IBM System
  8. LIBRA - Program Optimization
The following sections are not in the preliminary edition. They will appear in the third volume of the Handbook.

Theorem Proving
A. Overview
B. Logic
C. Resolution Theorem Proving
   1. Basic resolution method
   2. Syntactic ordering strategies
   3. Semantic & syntactic refinement
D. Non-resolution theorem proving
   0. Overview
   1. Natural deduction
   2. Boyer-Moore
   3. LCF
E. Uses of theorem proving
   1. Use in question answering
   2. Use in problem solving
   3. Theorem Proving languages
   4. Man-machine theorem proving
   5. In Automatic Programming
F. Proof checkers

Vision
A. Overview
B. Image-level processing
   1. Overview
   2. Edge Detection
   3. Texture
   4. Region growing
   5. Overview of Pattern Recognition
C. Spatial-level processing
   1. Overview
   2. Stereo information
   3. Shading
   4. Motion
D. Object-level Processing
   1. Overview
   2. Generalized cones and cylinders
E. Scene level processing
F. Vision systems
   1. Polyhedral or Blocks World Vision
      a. Overview
      b. COPYDEMO
      b. Guzman
      c. Falk
      d. Waltz
      e. Navatya
   2. Robot vision systems
   3. Perceptrons

Robotics
A. Overview
B. Robot Planning and Problem Solving
C. Arms
D. Present Day Industrial Robots
E. Robotics Programming Languages
Information Processing Psychology

A. Overview
B. Memory Models
   1. Overview
   2. EPAM
   3. Semantic Net Models
      a. Quillian & Collins
      b. HAM-ACT (Anderson & Bower)
      c. LNR ASNs
   4. Production Systems a Memory Models (Newell, Moran, ACT)
   5. Higher level structures (Schemas, scripts & Frames)
C. Human Problem Solving
D. Behavioral Modeling
   1. Belief Systems
   2. PARRY
   3. Conversational Postulates (Grice, TW)
   4. Abelson, J. Carbonell, Jr.,

Learning and Inductive Inference

A. Overview
B. Simple Inductive Tasks
   1. Sequence Extrapolation
   2. Grammatical Inference
C. Pattern Recognition
   1. Character Recognition (Selfridge, etc.)
   2. Other (e.g. Speech)
D. Learning Rules and Strategies of Games
   1. Formal Analysis
   2. Individual Examples of Games-learning programs
E. Single Concept Formation
F. Multiple Concept Formation: Structuring a Domain (AM, Meta-DENDRAL)
G. Interactive Cumulation of Knowledge (TEIRESIAS)

Planning and Related Problem-Solving Techniques

A. Overview of Problems Solving
B. Planning
   1. Overview (pointers to discussions in Search, Robotics, AI Langs)
   2. STRIPS (see IID5)
   3. ABSTRIPS (see IID6)
   4. NOAH
   5. HACKER
   6. INTERPLAN (Tate)
   7. Rieger's inference engine
   8. Rutgers work (Schmidt, Shridharan)
   7. QA3 (see IXE1)
C. Reasoning by Analogy
   1. Overview
   2. Evans's ANALOGY Program
   3. ZORBA
   4. Winston (see Learning)
D. Constraint relaxation
   1. Waltz (see Vision)
   2. REF-ARF