## Chapter 1 Introduction

### 1.1Introduction

Chomsky hierarchy 乔姆斯基分层
Recursively enumerable language 递归可枚举语言被命名为 0-型语言，
Context sensitive language 上下文相关语言被命名为 1-型语言，
Context free languahe 上下文无关语言被命名为 2-型语言，
Regular language 正则语言被命名为 3-型语言
Turing machine 图灵机
Linear state automaton 有限状态自动机
Pushdown automaton 下推自动机
Finite state automaton 有限状态自动机

### 1.2 Three Basic Concepts

**Terms：**

Concatenation 连接
Reverse 逆
Empty string 空串
Substring 子串
Prefix 前缀
Suffix 后缀

if $w = abbab$,

then $\{\lambda, a, ab, abb, abba, abbab\}$ is the set of all prefixes of $w$,

while $bab, ab, b$ are some of its suffixes.

Power 幂

**Languages(语言)**

**Language operations：**

Complement 补

$$\overline{L} = \Sigma^* - L$$

Reverse 逆

$$L^R = \{w^R : w \in L\}$$

Concatenation 连接

$$L_1L_2 = \{xy : x \in L_1,\ y \in L_2\}$$

$$L^0 = \{\lambda\}$$

$$L^1 = L$$

$$L^n = L^{n-1}L$$

Star-Closure 星闭包

$$L^* = L^0 \cup L^1 \cup L^2 \cdots$$

Positive-Closure 正闭包

$$L^+ = L^1 \cup L^2 \cdots$$

**Grammars（文法）：**

A grammar G is defined as a quadruple

$$G = (V, T, S, P),$$

where V is a finite set of objects called **variables(变量)**,

T is a finite set of objects called **terminal symbols（终极符）**,

S ∈ V is a special symbol called the **start variable（开始变量）**,

P is a finite set of **productions（产生式）**.

It will be assumed without further mention that the sets V and T are non-empty and disjoint.

Derive 推导
Reduction 规约（推导的逆过程）
Unspecified 未说明的
Sentential forms 句型
Conjecture 猜想

**Automata(自动机):**

Transition function 转移函数
Deterministic automata 确定性自动机
Uniquely determined 唯一确定的
Nondeterministic automata 非确定性自动机

**Chapter2 Finite Automata (FA:DFA&NFA)**

- A DFA is defined by the 5-tuple:
  $(Q, \sum, \delta, q_0, F)$
- A Deterministic Finite Accepter(DFA) consists of:
  $Q$ : a finite set of internal states
  $\sum$ : a finite set of input symbols (alphabet)
  $\delta$ : $Q \times \sum \rightarrow Q$,is a total function called the transition function
  $q_0$ : a initial state (start state)
  $F$ : set of final states(accepting state)

| | |
|---|---|
| Internal states | 内部状态 |
| Initial state | 初始状态 |
| Vertices | 顶点 |
| Implement | 实施、 执行 |
| Trap state | 陷阱状态 |
| λ-transition | 空转移 |
| exhaustive search | 穷举搜索 |
| concisely | 简明扼要地 |

**Minimal dfa**

| | |
|---|---|
| Indistinguishable | 不可区分地的 |
| Distinguishable | 可区分的 |
| Equivalence relation | 等价关系 |
| Inaccessible | 不可到达的 |
| Minimal | 最小的 |

**Chapter 3 Regular languages and regular grammars**

| | |
|---|---|
| Regular expressions | 正则表达式 |
| Union | 并 |
| Primitive | 原始的 |
| Precedence | 优先级 |
| Schematically | 示意性地 |
| Generalized transition graph | 通用转移图 |
| Traverse cycle | 遍历循环 |
| Enumerate | 枚举 |
| Right- linear | 右线性 |
| Left-linear | 左线性 |
| Mimic | 模仿 |

**Chapter 4 CFL**

| | |
|---|---|
| Leftmost and rightmost derivations | 最左推导、最右推导 |
| Parsing | 分析 |
| Ambiguity | 二义性 |

Inherently ambiguous 固有二义性的

**Chapter 6 Simplication of CFG and Normal forms**

Simplication 化简

λ-productions 空产生式

Unit-productions 单一产生式

Useless productions 无用产生式

Normalization 范式

Chomsky Normal Form（CNF） 乔姆斯基范式

**• DEFINITION 6.4**

A context-free grammar is in Chomsky normal form if all productions are of the form

$$A \rightarrow BC$$

or

$$A \rightarrow a,$$

where A, B, C are in V , and a is in T.

Greibach Normal Form (GNF) 格里巴克范式

**• DEFINITION 6.5**

A context-free grammar is said to be in Greibach normal form if all productions have the form

$$A \rightarrow ax,$$

where $a \in T$ and $x \in V^*$.

(a是1个终极符开头，x是任意变量的串)

**Chapter 7 Pushdown Automata**

Nondeterministic pushdown accepter(npda) 非确定下推自动机

A nondeterministic pushdown accepter (npda,非确定下推自动机) is defined by the septuple（七元组）

$$M = (Q, \Sigma, \Gamma, \delta, q_0, z, F),$$

where

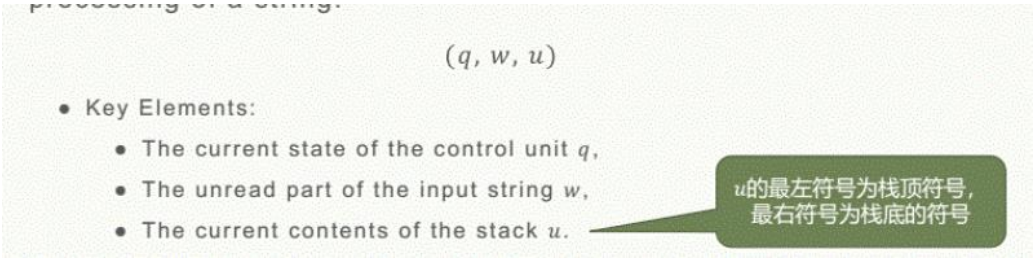
- Q is a finite set of internal states of the control unit,
- Σ is the input alphabet,
- Γ is a finite set of symbols called the stack alphabet（栈符号）,
- $\delta$: $Q \times (\Sigma \cup \{\lambda\}) \times \Gamma \rightarrow 2^{Q \times \Gamma^*}$ is the transition function, $2^{Q \times \Gamma^*}$ is the power set of $Q \times \Gamma^*$,
- $q_0 \in Q$ is the initial state of the control unit,
- $z \in \Gamma$ is the stack start symbol（栈开始符号）,
- $F \subseteq Q$ is the set of final states.

old state, input symb., stack top　new stata(s),new stack top(s

$$\delta(q_1, a, b) = \{(q_2, cd), (q_3, \lambda)\}.$$

Instantaneous description 瞬像描述

Configuration 格局




**Chapter 8 Properties of CFL**

Split 分离

Dependency graph 依赖图