

※ 注意：請於試卷內之「非選擇題作答區」作答，並應註明作答之題號。

1. 語言計算 (50%)

羅托卡特語 (Rotokas) 是個由大約 4000 名巴布亞紐幾內亞島嶼居民所使用的語言。其中央方言有著或許是全世界字母數量最少的現代字母書寫系統與發音數量。由 12 個字母表示 11 個音素，如表一所示。

Vowels

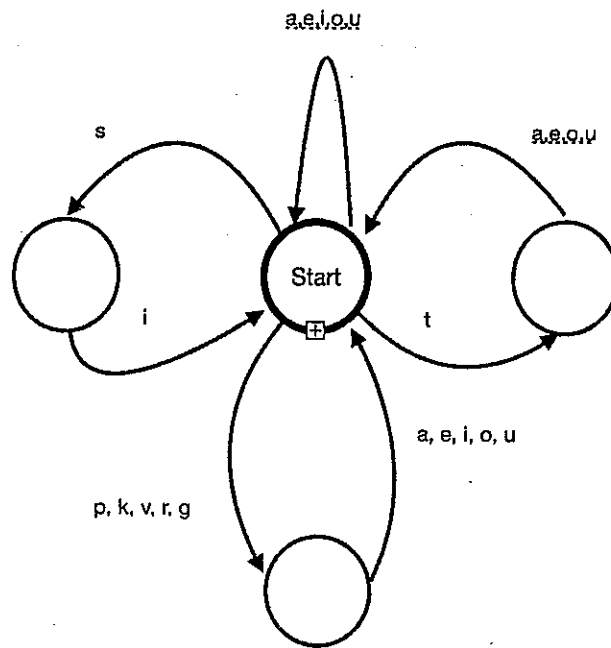
a	e	i	o	u	aa	ee	ii	oo	uu
[a]	[e]	[i]	[o]	[u]	[a:]	[e:]	[i:]	[o:]	[u:]

Consonants

g	k	p	r	s	t	v
[g]	[k]	[p]	[r]	[t]	[t]	[β]

表一

我們可以有限狀態自動機 (Finite State Automaton, FSA) 來辨識羅托卡特語的詞彙 (開始與終止狀態相同)。例如以下的 FSA 可以辨識出 puraveva, avaopa, kareveiepa, ovokirovuia 為合法的詞，而 ovgi, gataap, ouag, vonoka 為不合法的詞。



請利用以上的 FSA，挑出以下的句子中，哪兩個詞不屬於羅托卡特語。

Oa iava pauto oratreopaveiepa, aviavia voav. Oire aviavia rorova.

見背面

## 2. 程式知識 (50%)

2.1 (25%) ELIZA (Weizenbaum, 1966) 可以說是規則模式導向的聊天機器人 (rule/pattern-based chatbot) 的始祖。以下是一些人機互動的片段，機器回應的部分皆以大寫字母表示。

Men are all alike.

IN WHAT WAY

They're always bugging us about something or other.

CAN YOU THINK OF A SPECIFIC EXAMPLE

Well my boyfriend made me come here.

YOUR BOYFRIEND MADE YOU COME HERE

He says I'm depressed much of the time.

I AM SORRY TO HEAR YOU ARE DEPRESSED

..

..

WHO ELSE IN YOUR FAMILY TAKES CARE OF YOU?

My father

YOUR FATHER

You are like my father in some ways.

WHAT RESEMBLANCE DO YOU SEE

You are not very aggressive but I think you don't want me to notice that.

WHAT MAKES YOU THINK I AM NOT AGGRESSIVE

You don't argue with me.

WHY DO YOU THINK I DON'T ARGUE WITH YOU

You are afraid of me.

DOES IT PLEASE YOU TO BELIEVE I'M AFRAID OF YOU

My father is afraid of everybody.

WHAT ELSE COMES TO MIND WHEN YOU THINK OF YOUR FATHER

Bullies.

DOES THAT HAVE ANYTHING TO DO WITH THE FACT THAT YOUR BOYFRIEND MADE YOU COME HERE

請試著解釋以下有關實作 ELIZA 的偽代碼 (pseudo-code)。

```
function ELIZA GENERATOR(user sentence) returns response
```

```
Find the word w in sentence that has the highest keyword rank
```

```
if w exists
```

```
    Choose the highest ranked rule r for w that matches sentence
```

```
    response ← Apply the transform in r to sentence
```

```
    if w = 'my'
```

```
        future ← Apply a transformation from the 'memory' rule list to sentence
```

```
        Push future onto memory stack
```

```
    else (no keyword applies)
```

```
        either
```

```
            response ← Apply the transform for the NONE keyword to sentence
```

```
        or
```

```
            response ← Pop the top response from the memory stack
```

```
return(response)
```

2.2 (25%) 請逐行解釋以下的 python 程式。

```
1 import nltk
2
3
4 for text in texts:
5     sentences = nltk.sent_tokenize(text)
6     for sentence in sentences:
7         words = nltk.word_tokenize(sentence)
8         tagged_words = nltk.pos_tag(words)
9         ne_tagged_words = nltk.ne_chunk(tagged_words)
10        print ne_tagged_words
11
```

試題隨卷繳回