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SUB: NLP

DEP:BS(SE)5TH

Question No. 1:

(08)

- a) Briefly explain NLP? Write the name of 2 Applications of NLP with example?
Write the name of 2 Challenges of NLP with example?

ANSWER: Natural language processing (NLP) is a subfield of linguistics, computer science, information engineering, and artificial intelligence concerned with the interactions between computers and human (natural) languages, in particular how to program computers to process and analyze large amounts of natural language data

APPLICATION:

Spell and Grammar Checking

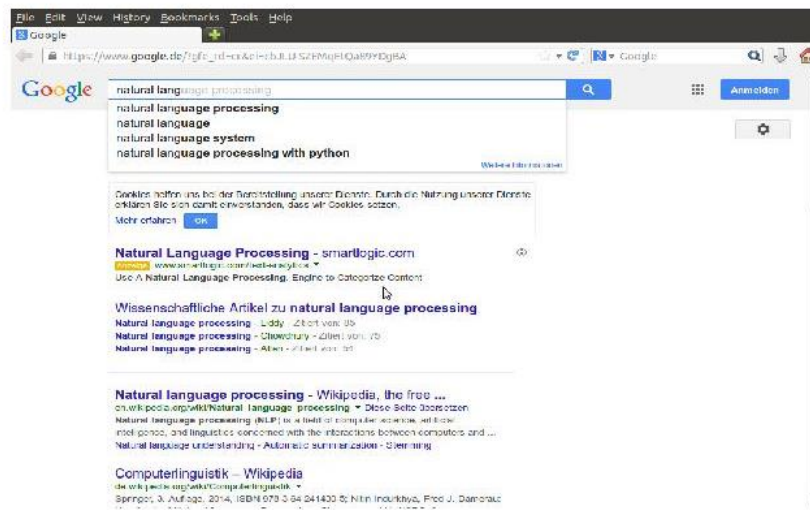
- Checking spelling and grammar
- Suggesting alternatives for the errors



8

Word Prediction

- Predicting the next word that is highly probable to be typed by the user



9

CHALLENGES:

Paraphrasing

- Different words/sentences express the same meaning
 - Season of the year
 - Fall
 - Autumn
 - Book delivery time
 - When will my book arrive?
 - When will I receive my book?

50

Ambiguity

- One word/sentence can have different meanings
 - Fall
 - The third season of the year
 - Moving down towards the ground or towards a lower position
 - The door is open.
 - Expressing a fact
 - A request to close the door

51

b) Define Phonology and Morphology with the help of example?

Phonetics and phonology

- The study of linguistic sounds and their relations to words

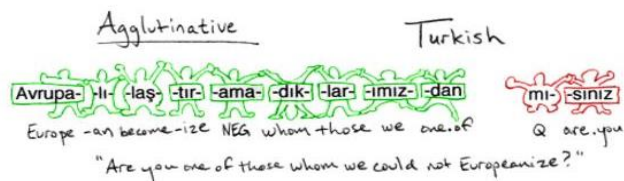
Das Funkalphabet - German Phonetic Spelling Code compared to the international ICAO/NATO code Listen to AUDIO for this chart (below)		
Germany*	Phonetic Guide	ICAO/NATO**
A wie Anton	AMN-tone	Alfa/Alpha
Ä wie Ärger	AIR-gerf	(1)
B wie Berta	BARF-tuh	Bravo
C wie César	SÄ-tzar	Charlie
Ch wie Charlotte	shar-LOT-tuh	(1)
D wie Dera	DOIE-tuh	Delta
E wie Emil	ay-MFMI	Echo
F wie Friedrich	FREED-tsooh	Foxtrot
G wie Gustav	gOOst-zeit	Golf
H wie Heinrich	HNE-reach	Hotel
I wie Ida	FFD-tuh	India/Indigo
J wie Julius	YUL-ee-joo	Juliet
K wie Kaufmann	KOOV-mann	Kilo
L wie Ludwig	LOOD-veg	Lima
AUDIO 1 -> Listen to mp3 for A-I		
M wie Martha	MAR-tuh	Mike
N wie Nordpol	NORI-pole	November
O wie Otto	AHT-ope	Oscar
Ö wie Ökonom (2)	UEH-ko-nomic	(1)
P wie Paula	POW-tuh	Papa
Q wie Quelle	KVEL-tuh	Quebec
R wie Richard	RFF-ehart	Romeo
S wie Siegfried (3)	SEEG-freed	Sierra
Sch wie Schule	SHOO-tuh	(1)
ß (Eszett)	ES-TSET	(1)
T wie Theodor	TAYH-thee	Tango
U wie Ulrich	OOD-reach	Uniform
Ü wie Übermut	ULIH-bar-moot	(1)
V wie Viktor	VICK-tor	Victor
W wie Wilhelm	VIL-tuhm	Whiskey
X wie Xanthippe	KSAN-tipp-uh	X-Ray
Y wie Ypsilon	IPP-see-lohn	Yankee
Z wie Zeppelin	TSEF-puh-leen	Zulu

<http://german.about.com/library/blfunkabc.htm>

43

Morphology

- The study of internal structures of words and how they can be modified
- Parsing complex words into their components



(<http://allthingslinguistic.com/post/50939757945/morphological-typology-illustrations-from>)

44

Question No. 2:

(10)

a) What do you mean by regular expressions?

ANSW: A formal language for specifying or searching text strings .

1. Disjunction
2. Ranges.
3. Negation in Disjunction.
4. The pipe for Disjunction.
5. Set of special characters.

b) Specify the text strings using the below regular expressions:

1. `/[a-zA-F0-9]`

a. Given string: a89opxcfff

Ans: a89 cfff

2. `/[abc]`

a. Given string abc ac acb a0b a2b a42c A878

Ans: abc ac acb ab ab ac

3. `a(b|c)`

a. Given string abc aa acbaob

Ans: ab ac

4. `/abc*`

a. Given string ab abc abcc babc abc abcc babc

Ans: abc abc abcc abc abc abcc abc.

5. `/abc+`

a. Given string ab abc abcc babc abc abcc babc

Ans: abc abcc abc abc abcc abc

6. `/[^a-zA-Z]`

a. Given string Price of cat \$1

Ans: \$1

7. `/[^a-zA-Z 0-9]`

a. Given string: a89 opx cfff \$1!

Ans: \$!

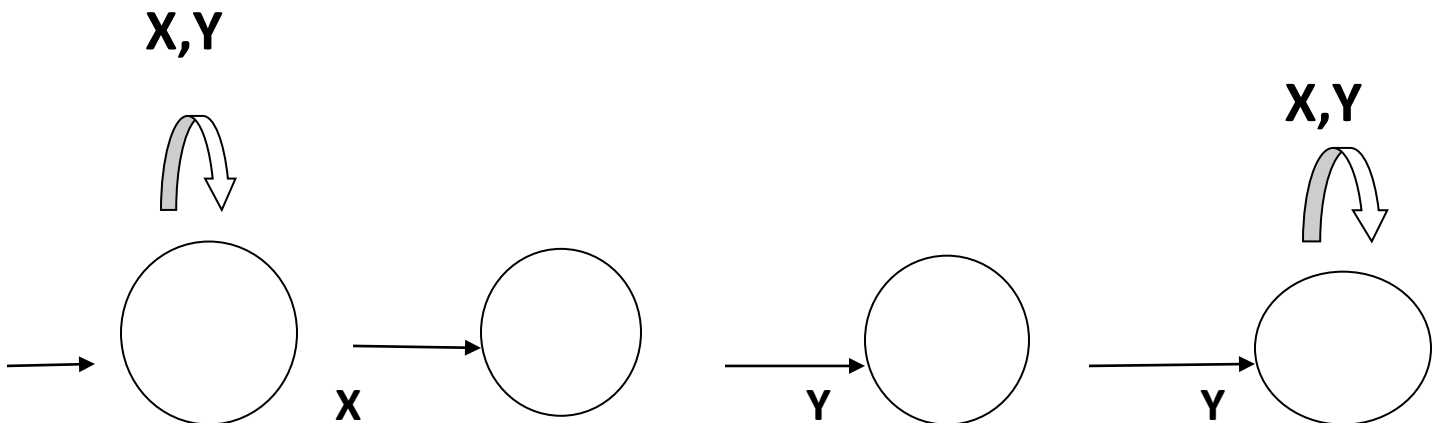
8. `/a(bc)`

- a. Given string: ab abc ac acb a0b a2b a42c A87d
 Ans: abc
9. /a[bc]
 a. Given string abc ac acb a0ba2b
 Ans: ab ac ac
- 10.a|b|c
 a. Given string: ab abc ac acb a0b a2b a42c A87d
 Ans: ab abc ac acb ab ab ac.

Question No. 3:
 (05)

a) Design an NFA over an alphabet $\Sigma=\{x,y\}$ such that every string accepted must have a substring --xyy-- ? identify its tuples and also convert it into DFA.

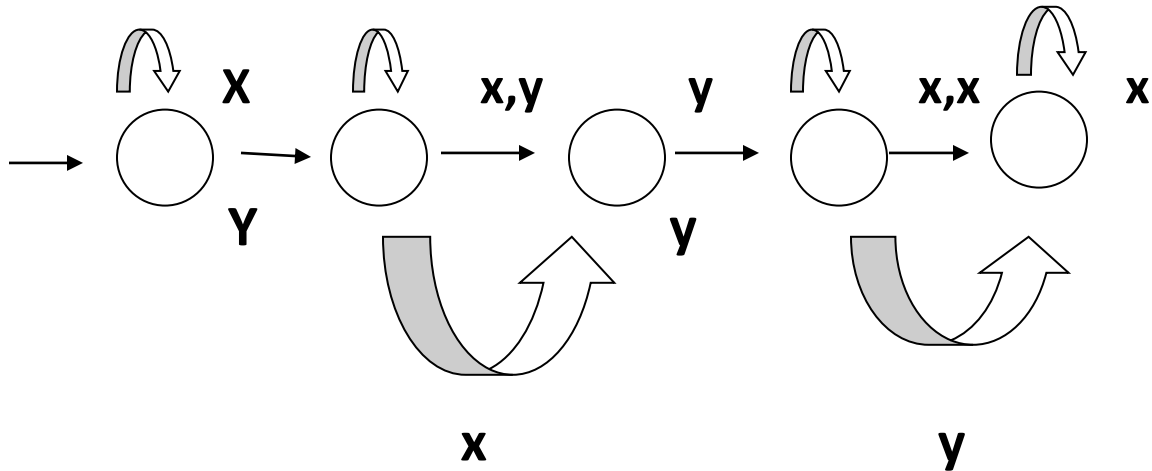
Ans: NFA:



Q	X	Y
Q0	Q0,q1	Q0
Q1	NULL	Q2
Q2	NULL	Q3
Q3	Q1	Q4

Q	X	Y
Q0	{Q0,Q1}	Q0
{Q0,Q1}	{Q0,Q1}	{ Q0,Q2 }
{Q0,Q2}	{Q0,Q1}	{ Q0,Q3 }
{Q0,Q3}	{Q0,Q1,Q3}	{ Q0, Q3 }
{Q0,Q1,Q3}	{Q0,Q1,Q3}	{ Q0, Q3 }

DFA:



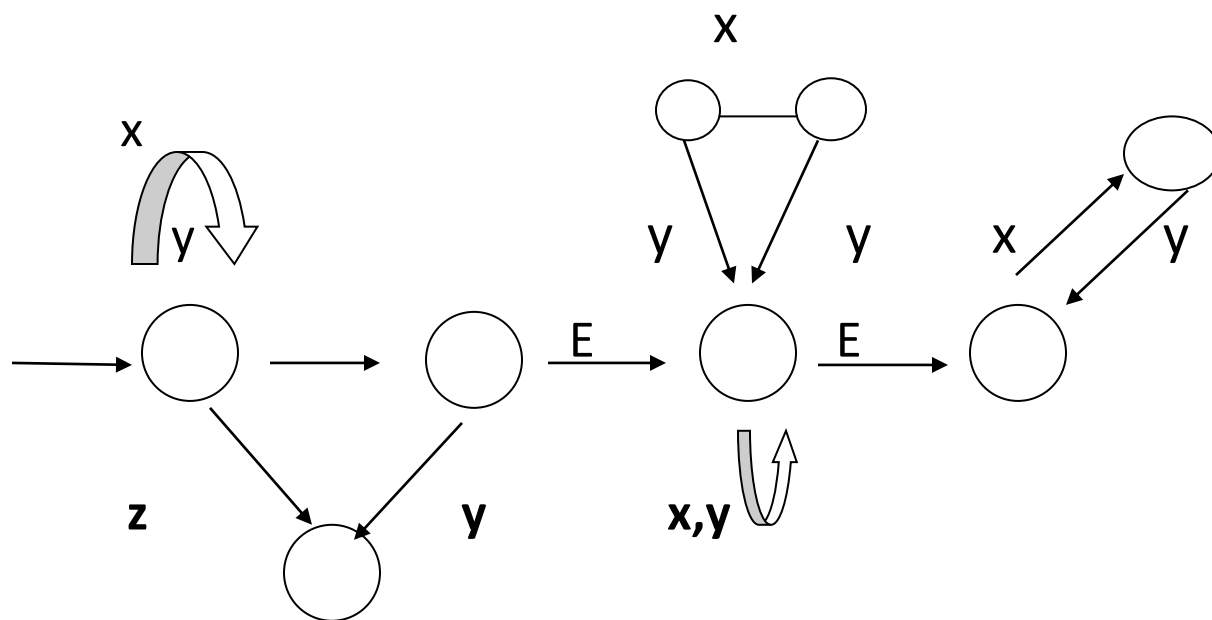
Question
(05)

No.

4:

a) Design an NFA for the regular expression : $(x+y+zx)((yxy)^*+(x+y)^*)(xy)^*$

ANS: Design NFA for the regular expression.



Question

No.

5:

(02)

Find the Maximum Likelihood Estimation of the below according to the given corpus using conditional probability:

<s> The green eyes </s>

<s> The green jungle </s>

<s> The green jungle </s>

<s> The green eyes </s>

<s> The green park </s>

<s> The green eyes </s>

i. $P(\text{jungle} | \text{The green})$

$$\text{Ans: } \frac{P(\text{The green jungle})=2}{P(\text{The green})} = \frac{2}{6} = 0.333$$

ii. $P(\text{eyes} | \text{The green})$

$$\text{Ans: } p(\text{The green eyes}) = \frac{3}{6} = 0.5$$

$$\frac{\quad}{P(\text{The green})} = \frac{1}{6}$$

iii. $P(\text{park} | \text{The green})$

$$\frac{P(\text{The green park})}{P(\text{The green})} = \frac{1}{6} = 0.17$$

$$P(\text{The green}) = \frac{1}{6}$$

iv. $P(\text{sea} | \text{The green})$

$$\frac{P(\text{The green park})}{P(\text{The green})} = \frac{0}{6} = 0$$

$$P(\text{The green}) = \frac{1}{6}$$

$$P(S) = \frac{2}{6} \cdot \frac{3}{6} \cdot \frac{1}{6} \cdot \frac{0}{6} = 0$$

$$\frac{2}{6} \cdot \frac{3}{6} \cdot \frac{1}{6} \cdot \frac{0}{6}$$