# MODELLING

Peyman Shobeiri

Supervisor: Dr.Moattar

- > A is a state.
- B is a state.

- > A is a state.
- B is a state.

- Probability of A→B: 50%
- Probability of A→A: 50%
- Probability of B→A: 50%
- Probability of B→B: 50%

- > A is a state.
- B is a state.

- Probability of A→B: 50%
- Probability of  $A \rightarrow A : 50\%$
- Probability of B→A: 50%
- Probability of B→B: 50%

A

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- B is a state.

- Probability of A→B: 50%
- Probability of A→A: 50%
- Probability of B→A: 50%
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AA

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- Probability of A→B: 50%
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- Probability of B→A: 50%
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AAB

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AABA

#### N-Gram Modelling – What are N-Grams?

"An N-gram is a contiguous sequence of n items from a given sample of text or speech" – Wikipedia

Items refer to states in Markov Chains

Items can be "characters", "words", "sentences" etc.

# N-Gram Modelling – What are N-Grams?

N = 2, then bigrams

N = 3, then trigrams

and so on

Characters are the states of Markov Chains

"the bird is flying on the blue sky"

N = 2

Bigrams = 'th', 'he', 'e', 'b', 'bi', 'ir', 'rd', 'd', 'i' etc.

N = 3

Trigrams = 'the', 'he ', 'e b', ' bi', 'bir', 'ird', 'rd ', 'd i' etc

"the bird is flying on the blue sky"

Consider only trigrams,

"the bird is flying on the blue sky"

Consider only trigrams,

Window size = N = 3

**Trigrams** 

**Trigrams** 

Trigrams the

Trigrams
the
he

t<mark>he</mark> bird is flying on the blue sky

```
Trigrams
the
he
```

e b

```
Trigram
the
he
e b
bi
```

the bird is flying on the blue sky

#### Trigram the he e b bi

bir

the b<mark>ird</mark> is flying on the blue sky

#### Trigrams

the

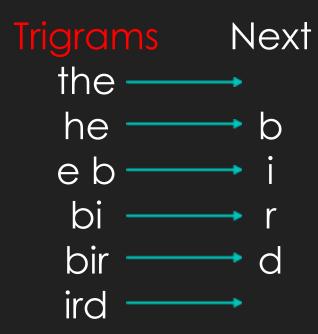
he

e b

bi

bir

ird



Words are the states of Markov Chains

"the bird is flying on the blue sky"

Consider only trigrams,

Window size = N = 3 (Words)

Trigrams

Trigrams the bird is

Trigrams
the bird is
bird is flying

Trigrams
the bird is
bird is flying
is flying on

Trigrams
the bird is
bird is flying
is flying on
flying on the

the bird is <mark>flying on the</mark> blue sky

the bird is flying on the blue sky

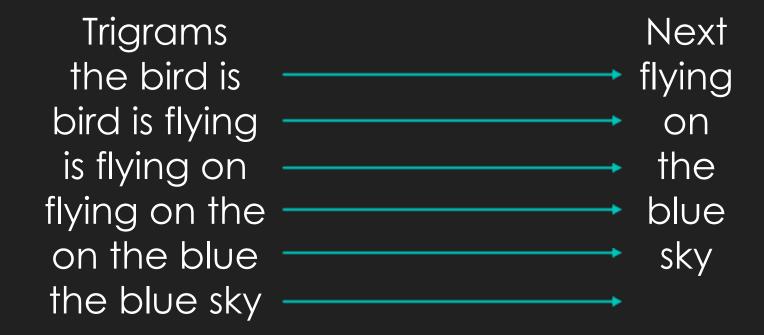
Trigrams
the bird is
bird is flying
is flying on
flying on the
on the blue

the bird is flying on the blue sky

Trigrams
the bird is
bird is flying
is flying on
flying on the
on the blue
the blue sky



# N-Gram Modelling – Usage



#### N-Gram Modelling – Usage



"the bird is"



"the bird is flying"

"the bird is flying"



"the bird is flying on"

"the bird is flying on"



"the bird is flying on the"

"the bird is flying on the"



"the bird is flying on the blue"

"the bird is flying on the blue"



"the bird is flying on the blue sky"

"the bird is flying on the blue sky"



"the bird is flying on the blue sky."

"the bird is flying on the blue sky."



"the bird is flying on the blue sky."

"the bird is sleeping"

"the bird is flying on the orange"