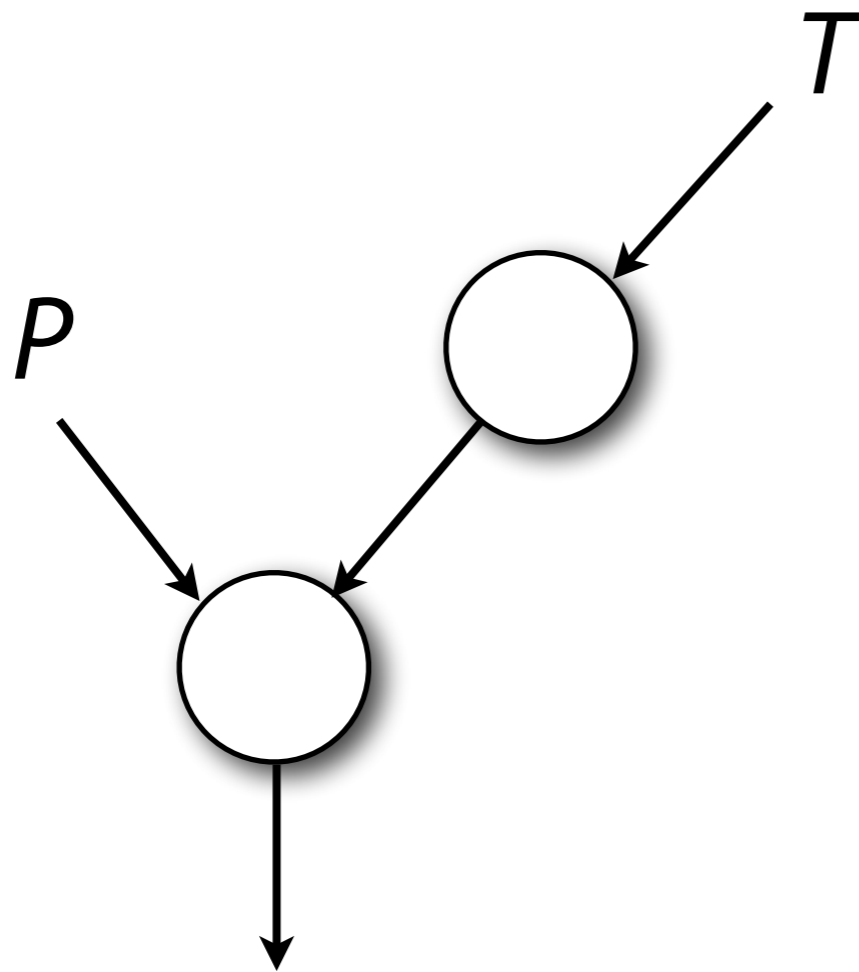


Preprocessing

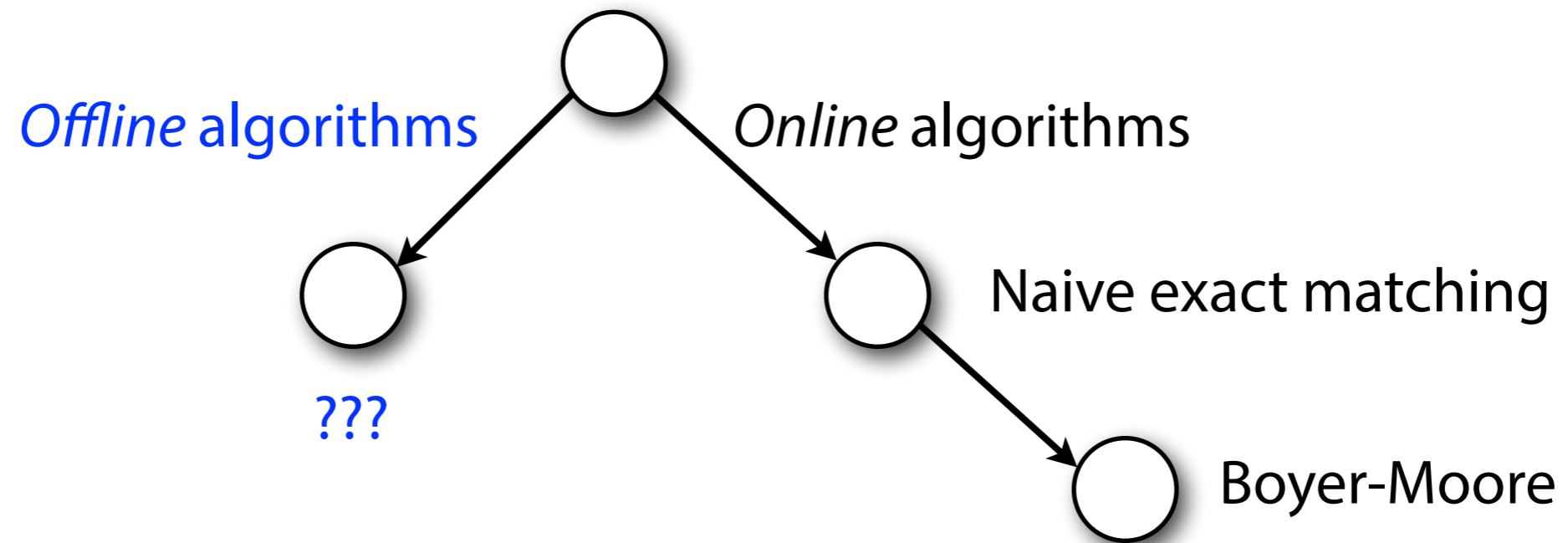
Algorithm that preprocesses T is *offline*.
Otherwise, algorithm is *online*.



Online or offline?

- Naïve algorithm
- Boyer-Moore
- Web search engine
- Read alignment

Offline



Index

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Index



Grocery store items grouped into aisles

Indexing DNA

Index of T



***T*: C G T G C G T G C T T**

Indexing DNA

Index of T
CGTGC: 0

T: CGTGCGTGCTT

Indexing DNA

Index of T

CGTGC: 0

GTGCG: 1

T: C G T G C G T G C T T

Indexing DNA

Index of T

CGTGC: 0

GTGCG: 1

TGCGT: 2

T: C G T G C G T G C T T

Indexing DNA

<i>Index of T</i>	
CGTGC:	0
→ GCGTG:	3
GTGCC:	1
TGCCT:	2

T: C G T G C G T G C T T

Indexing DNA

Index of T

CGTGC:	0, 4
GCGTG:	3
GTGCC:	1
TGCCT:	2



T: C G T G C G T G C T T

Indexing DNA

Index of T

CGTGC: 0, 4

GCGTG: 3

GTGCC: 1

GTGCT: 5

TGCCT: 2

T: C G T G C G T G C T T

Indexing DNA

Index of T

CGTGC: 0, 4

GCGTG: 3

GTGCC: 1

GTGCT: 5

TGCCT: 2

TGCTT: 6

T: C G T G C G T G C T T

Indexing DNA

k-mer: substring
of length *k*

<i>Index of T</i>	
C G T G C	: 0, 4
G C G T G	: 3
G T G C C	: 1
G T G C T	: 5
T G C C T	: 2
T G C T T	: 6

5-mer index

T: C G T G C G T G C T T

Querying the index

Index of T

CGTGC: 0, 4
GCGTG: 3
GTGCC: 1
GTGCT: 5
TGCCT: 2
TGCTT: 6

?

T: C G T G C G T G C T T

P: G C G T G C

Querying the index

Index of T

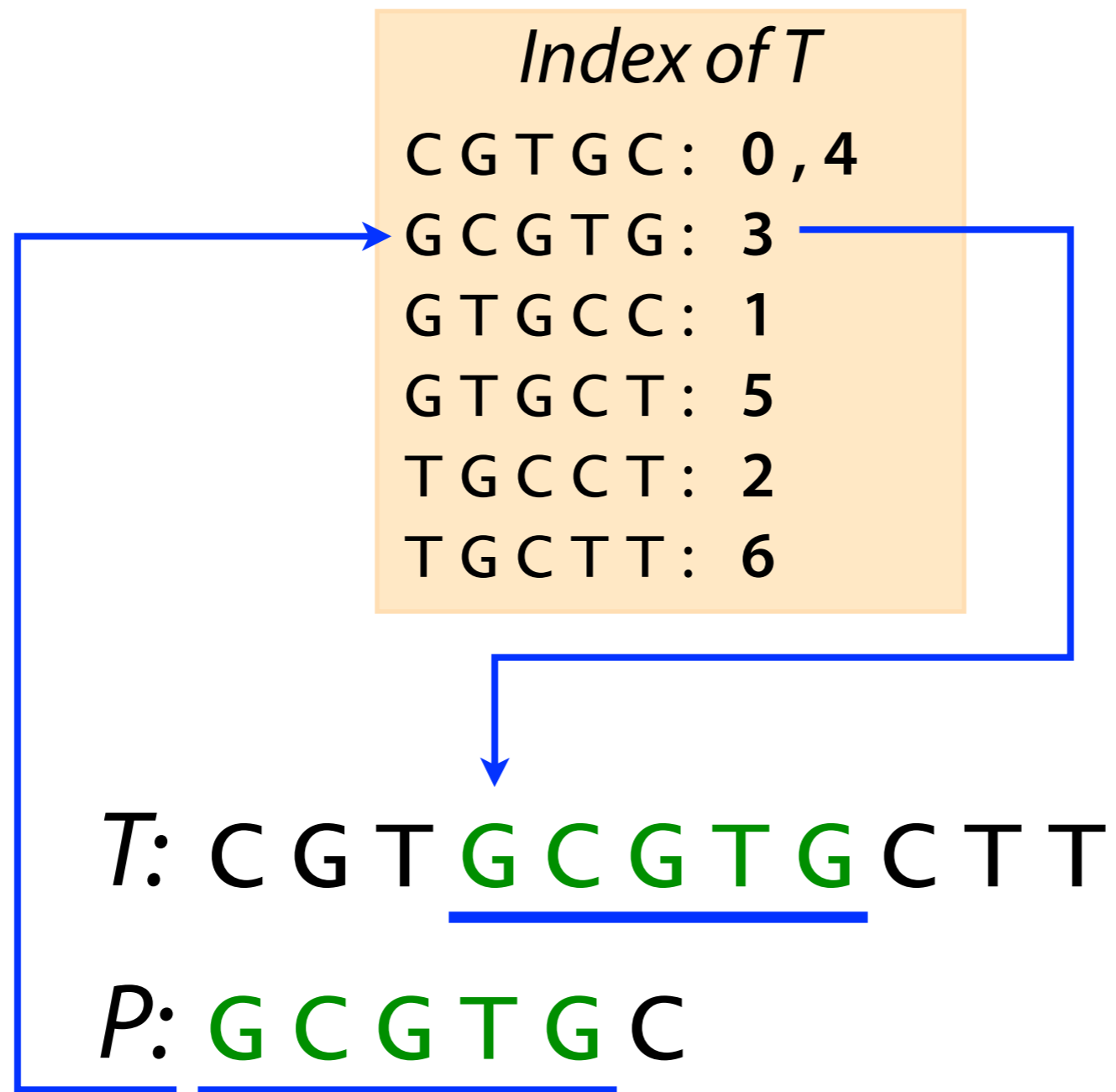
CGTGC: 0, 4
GCGTG: 3
GTGCC: 1
GTGCT: 5
TGCCT: 2
TGCTT: 6

T: C G T G C G T G C T T

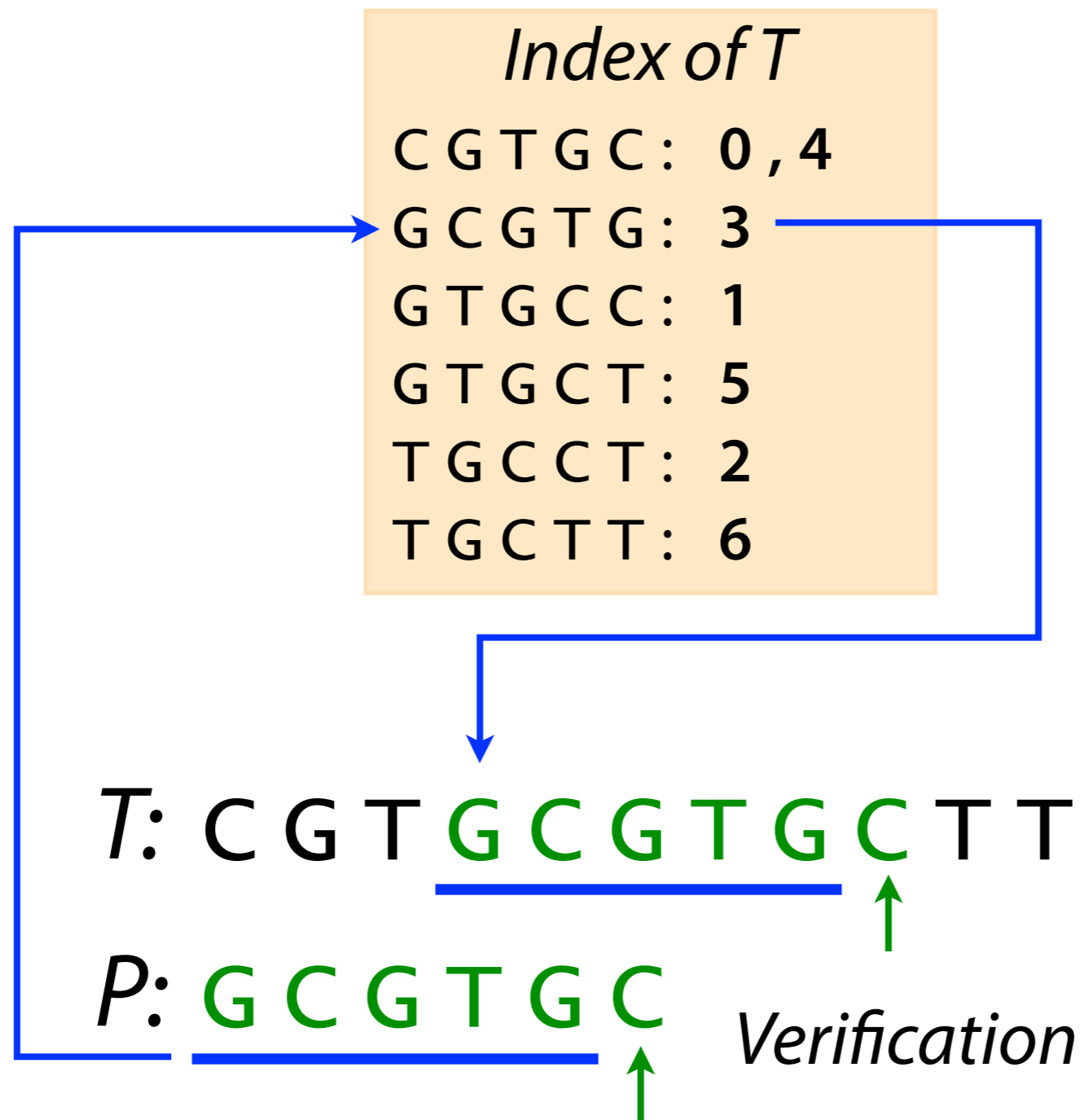
P: G C G T G C



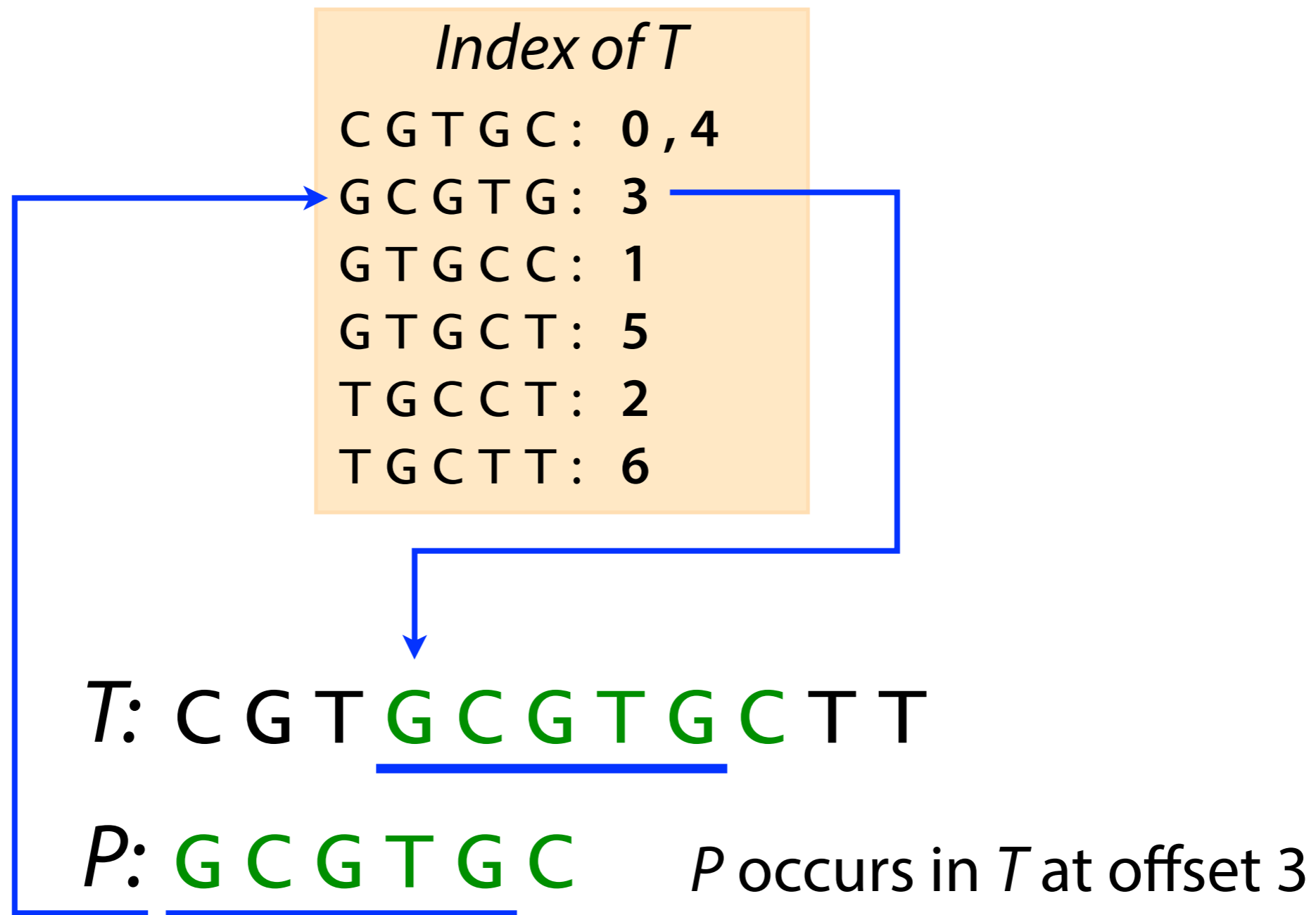
Querying the index



Querying the index



Querying the index



Querying the index

Index of T

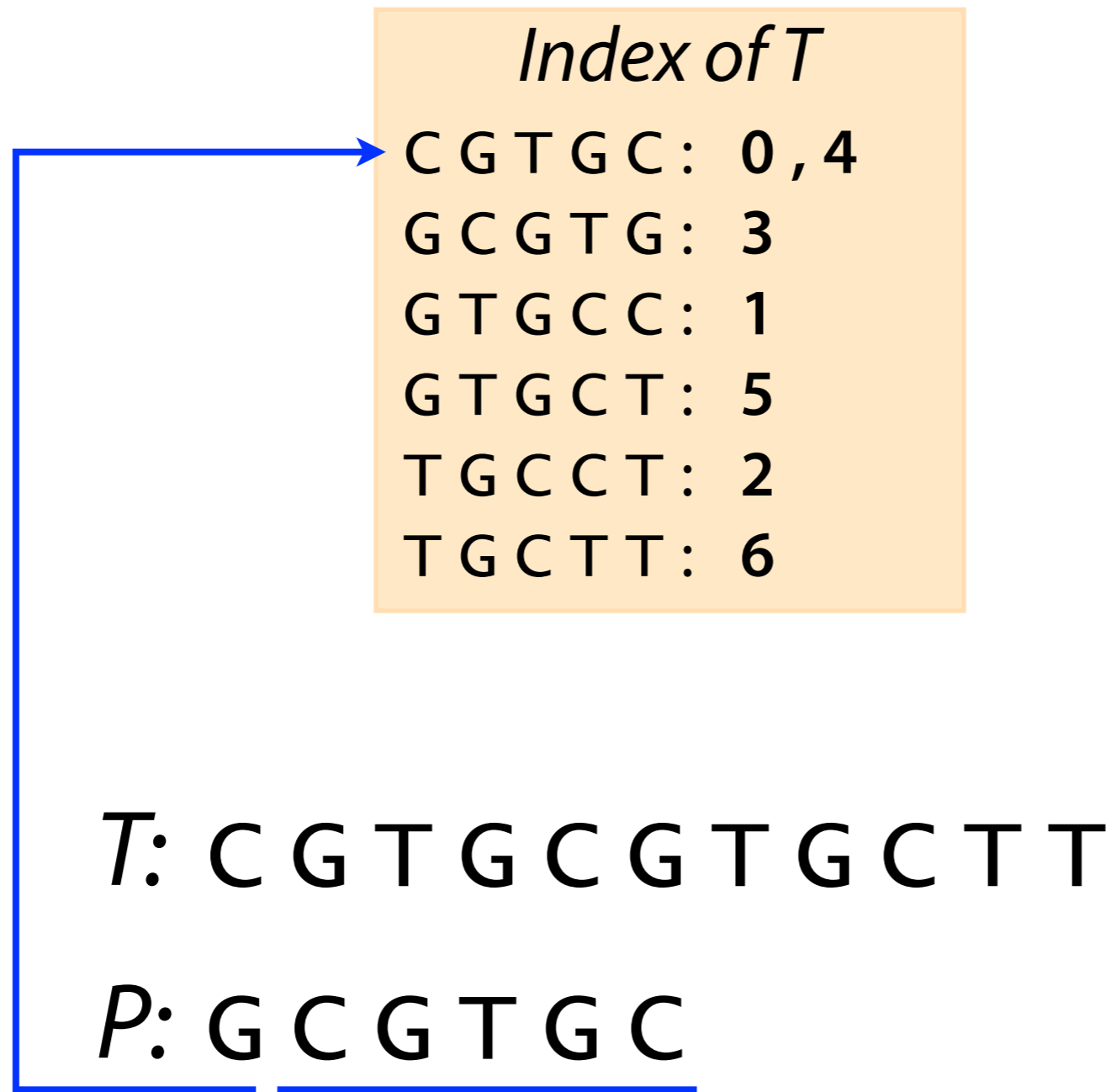
CGTGC: 0, 4
GCGTG: 3
GTGCC: 1
GTGCT: 5
TGCCT: 2
TGCTT: 6

?

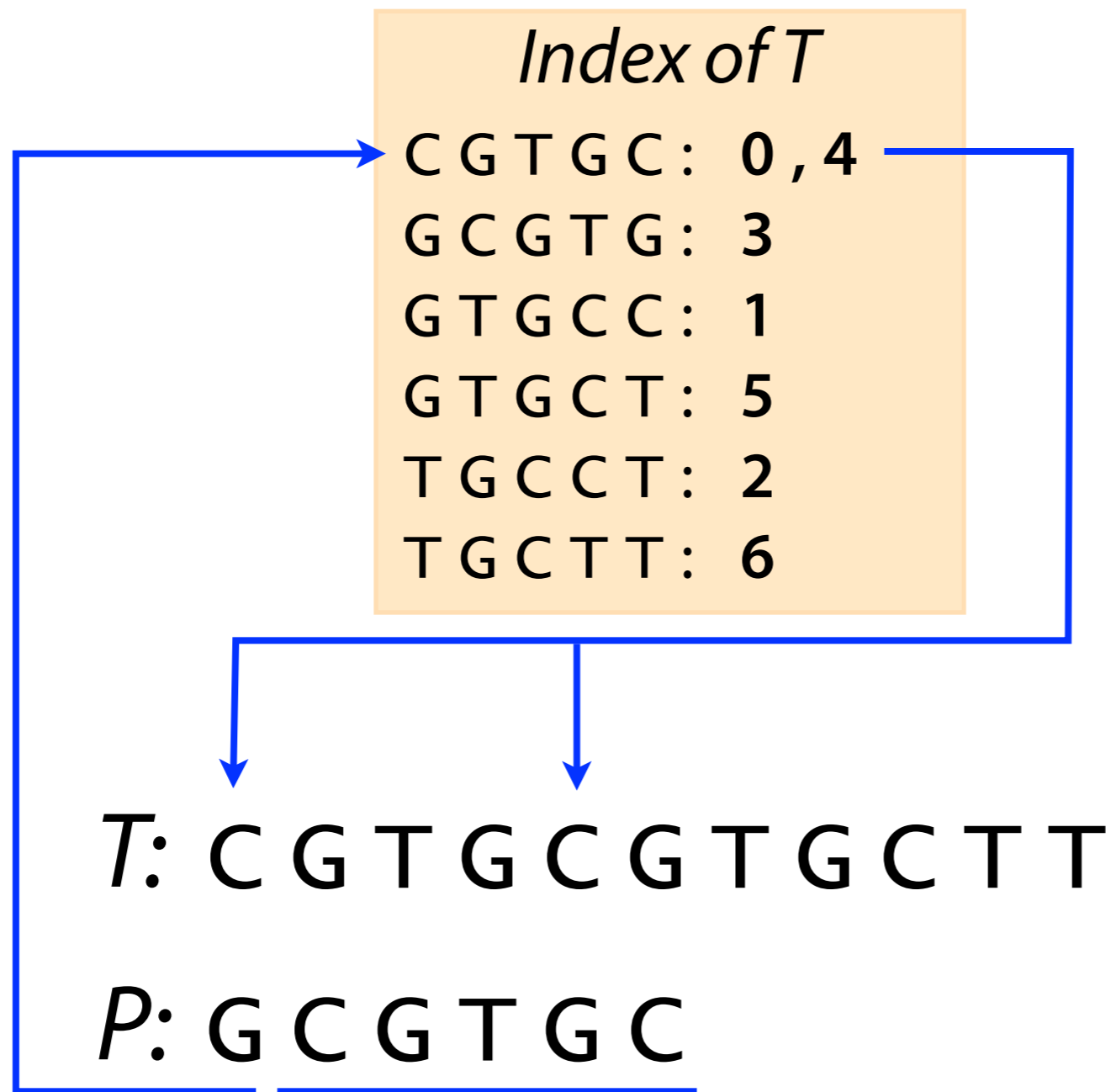
T: C G T G C G T G C T T

P: G C G T G C

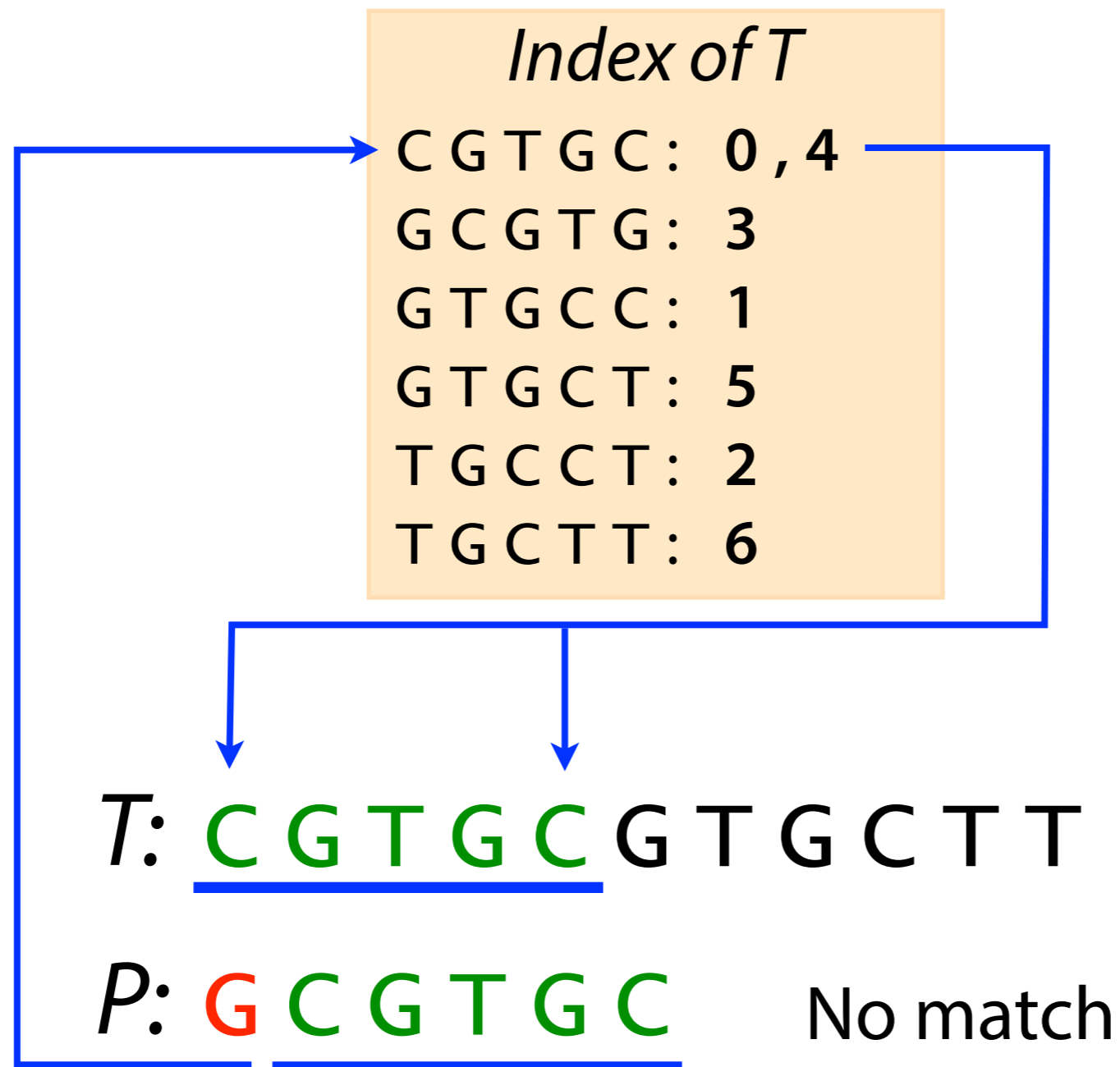
Querying the index



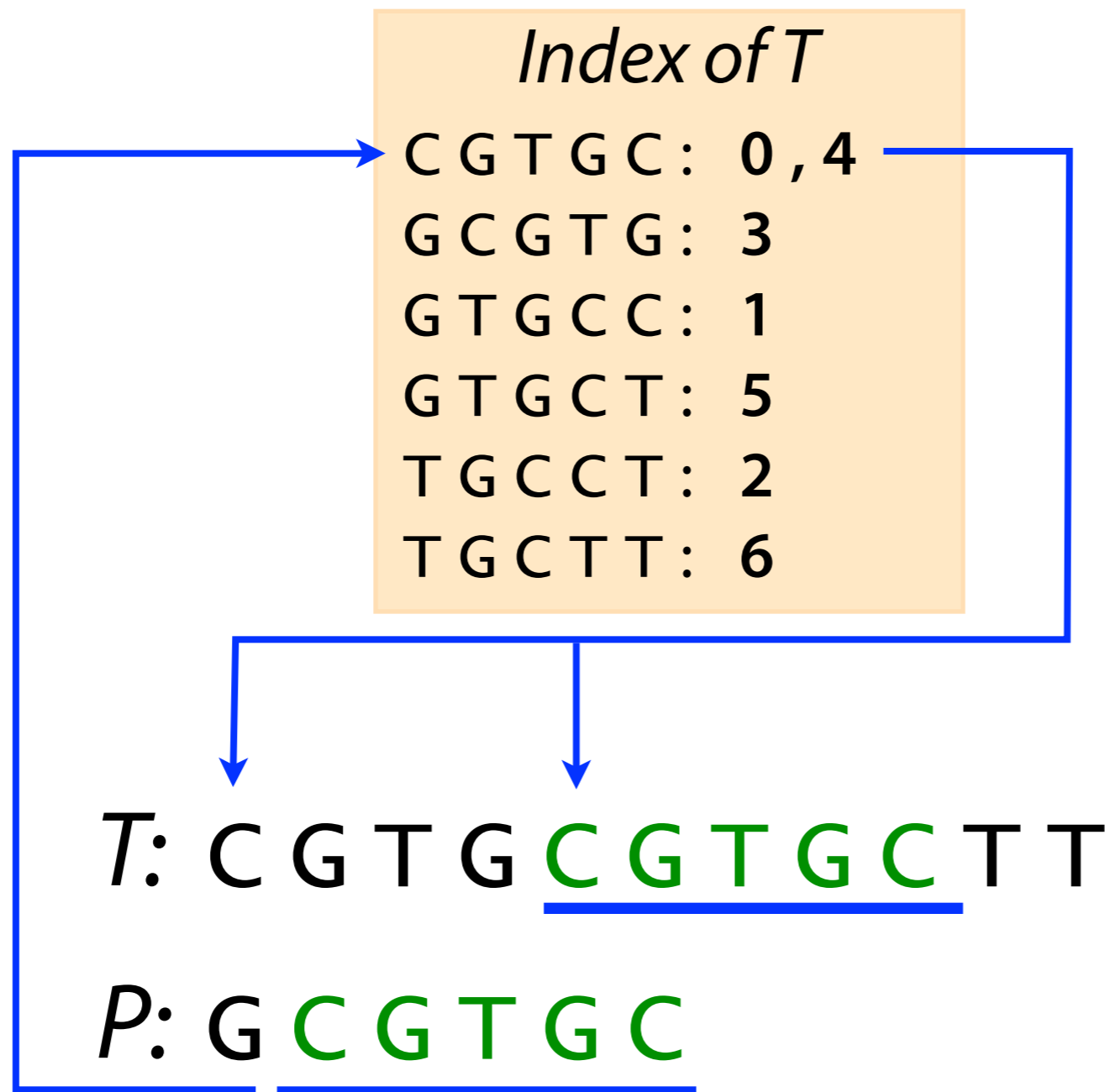
Querying the index



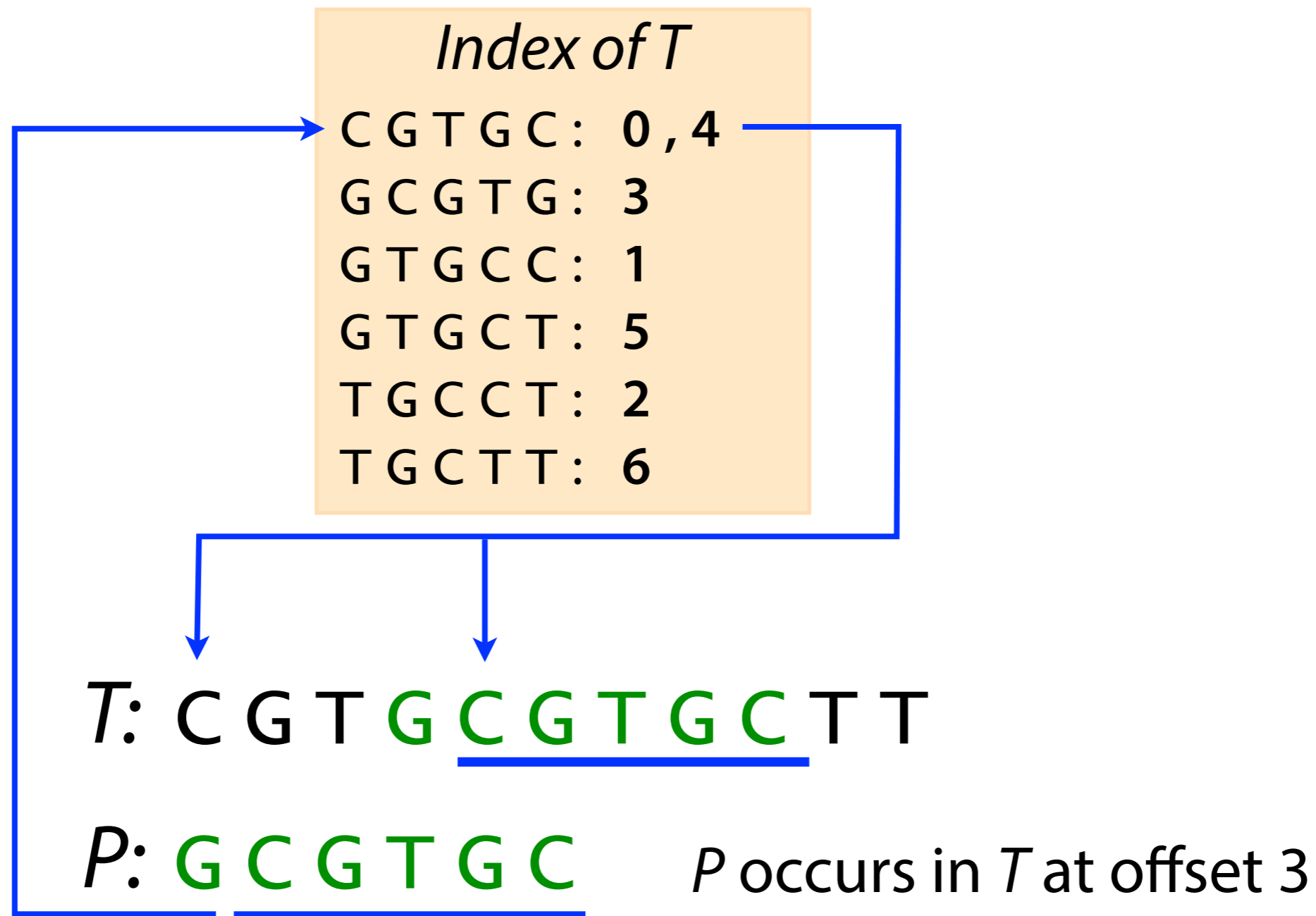
Querying the index



Querying the index



Querying the index



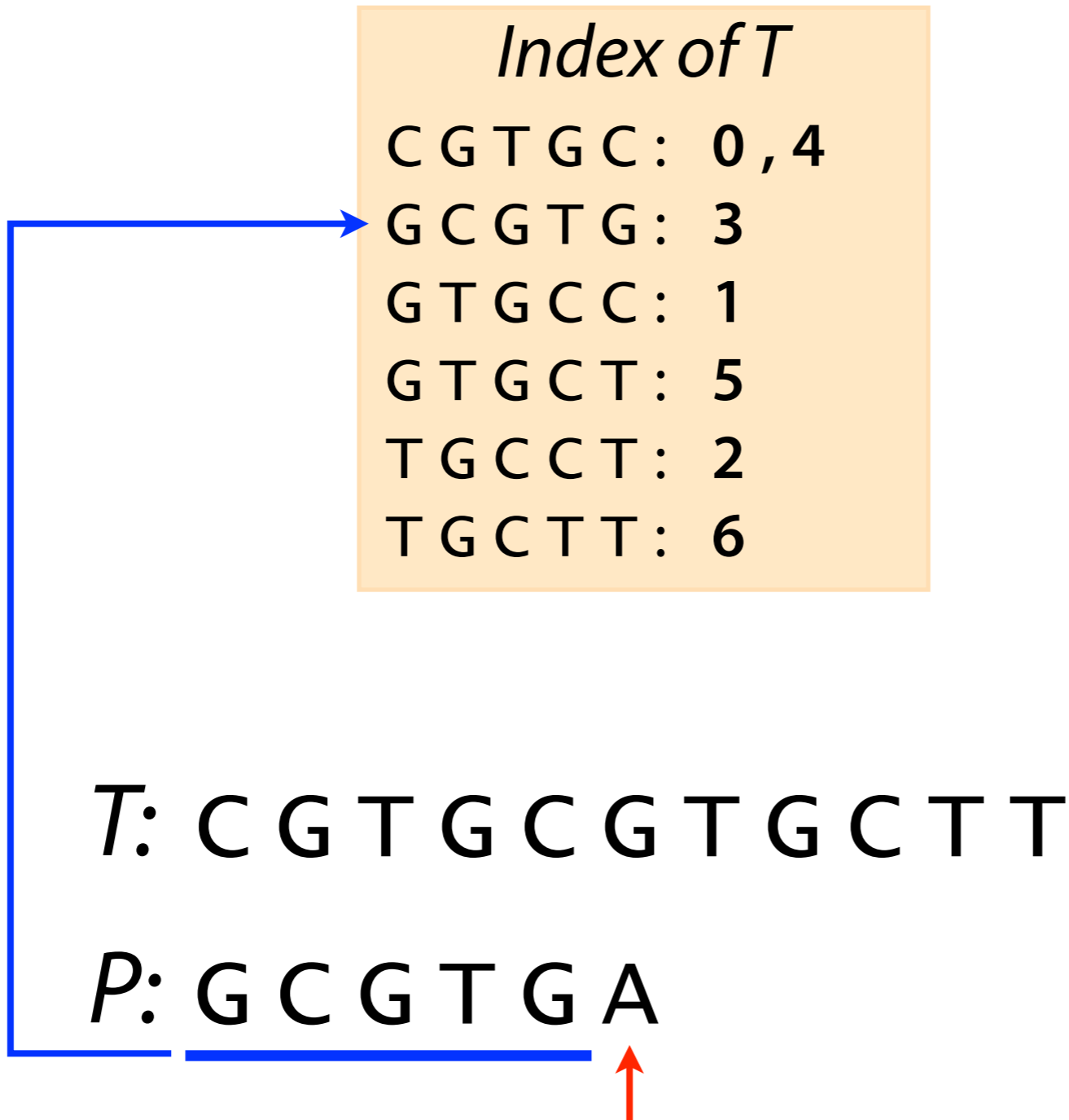
Querying the index

Index of T

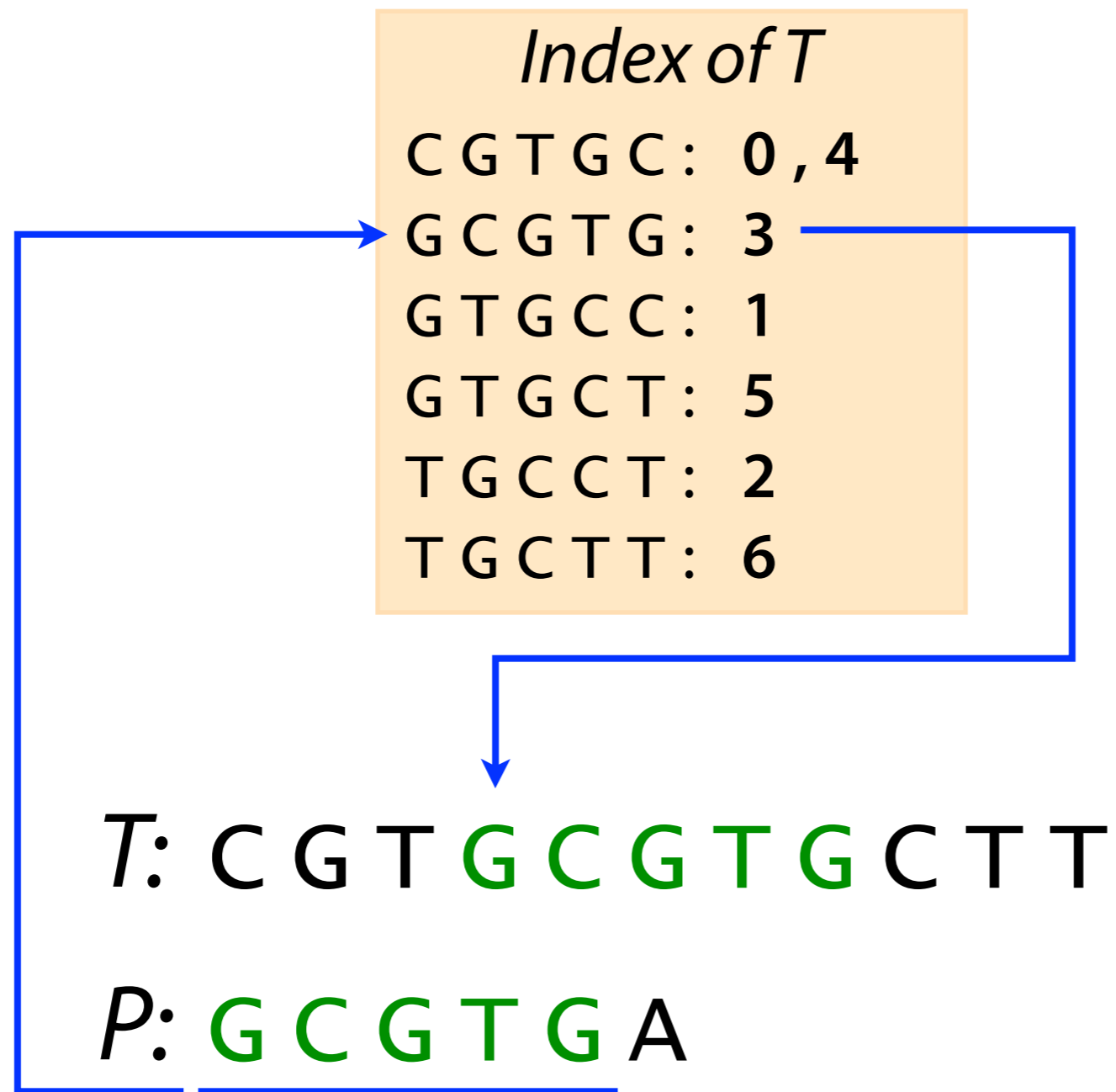
CGTGC: 0, 4
GCGTG: 3
GTGCC: 1
GTGCT: 5
TGCCT: 2
TGCTT: 6

T: C G T G C G T G C T T

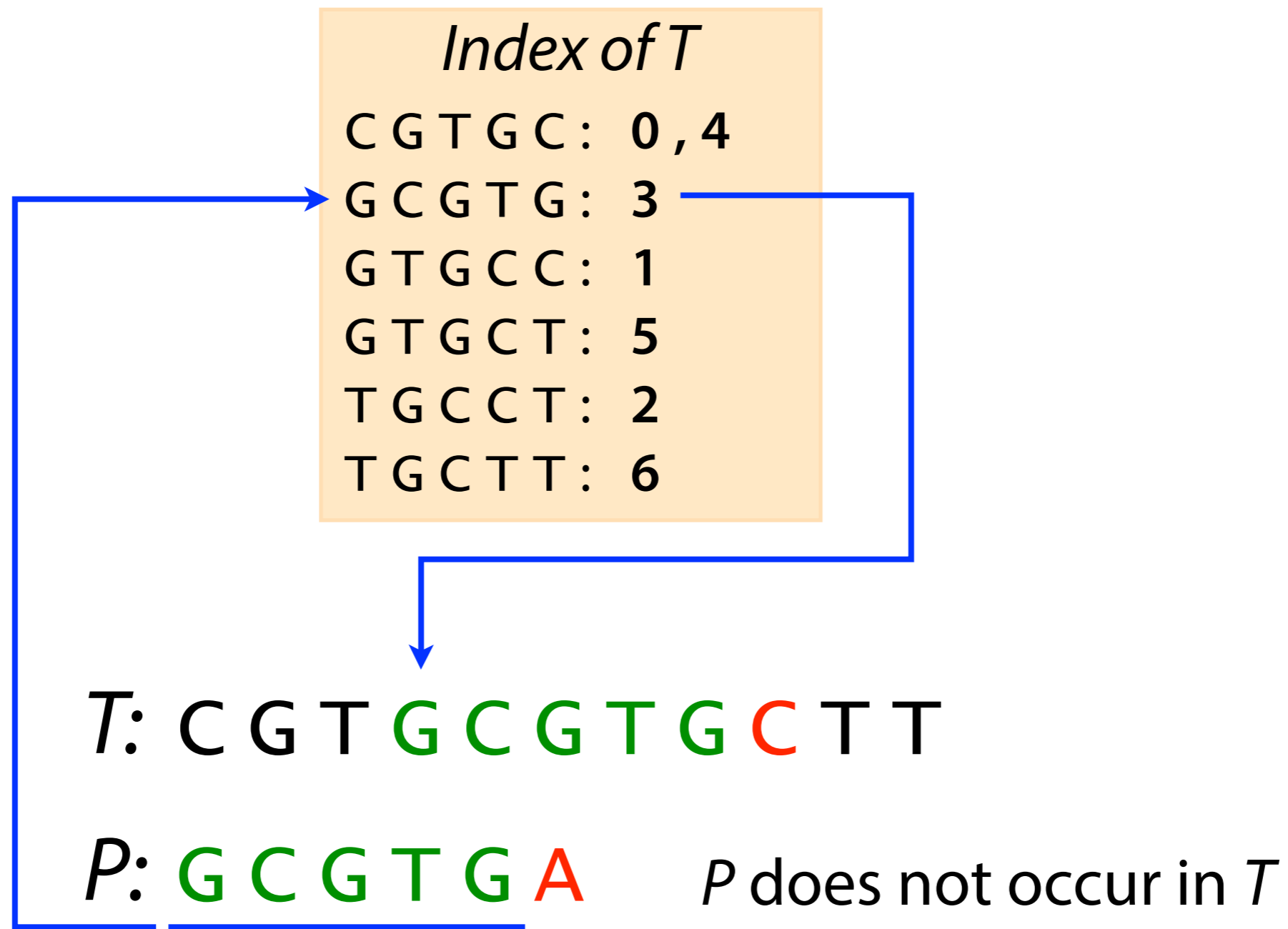
P: G C G T G A



Querying the index



Querying the index



Querying the index

Index of T

CGTGC:	0, 4
GCGTG:	3
GTGCC:	1
GTGCT:	5
TGCCT:	2
TGCTT:	6

T: C G T G C G T G C T T

P: G C G T A C



Querying the index

Index of T

C G T G C : 0 , 4

G C G T G : 3

G T G C C : 1

G T G C T : 5

T G C C T : 2

T G C T T : 6

T: C G T G C G T G C T T

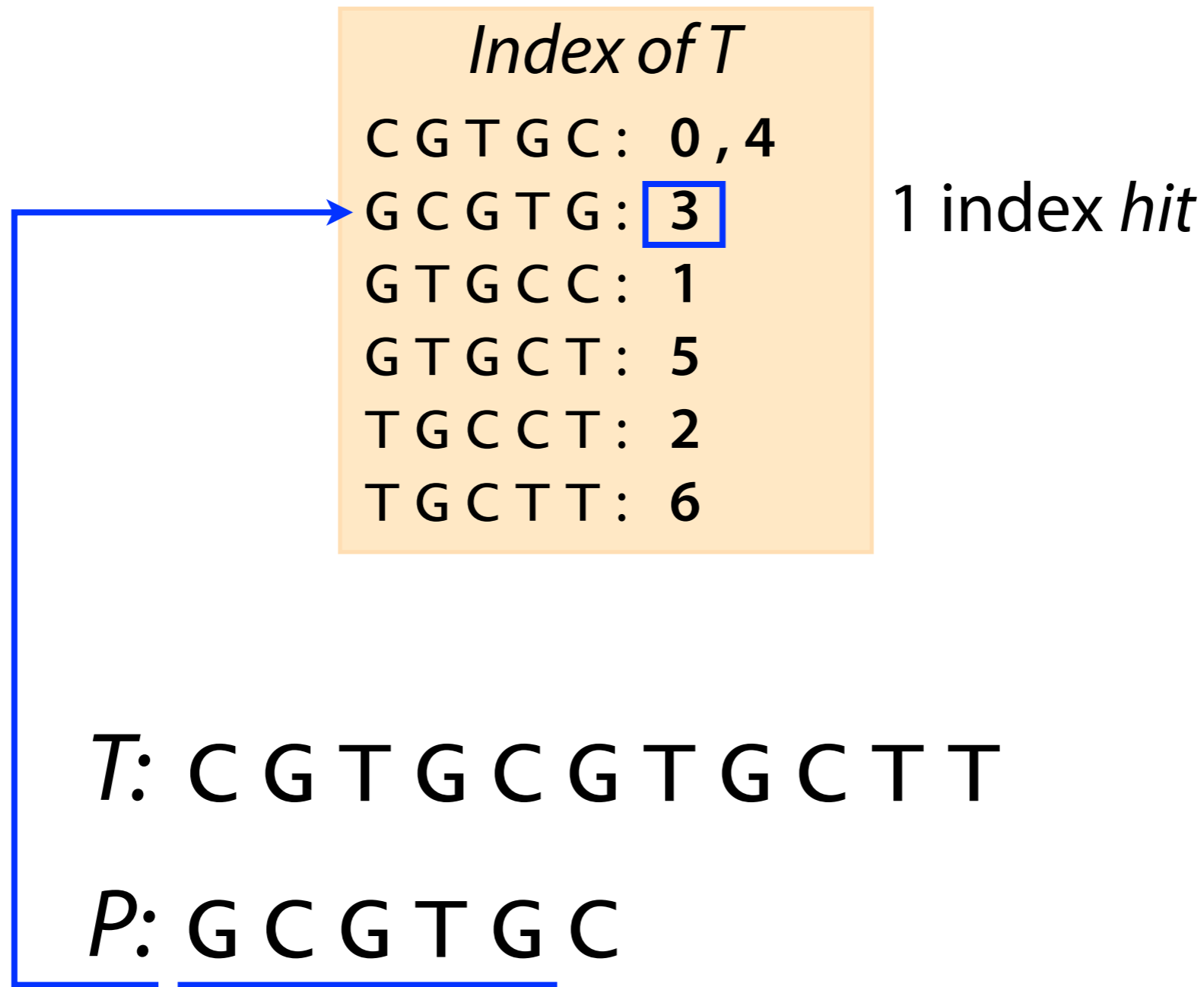
P: G C G T A C

P does not occur in *T*

X



Querying the index



Querying the index

