

# CYK Algorithm



Explore the use manual



# What is CYK?



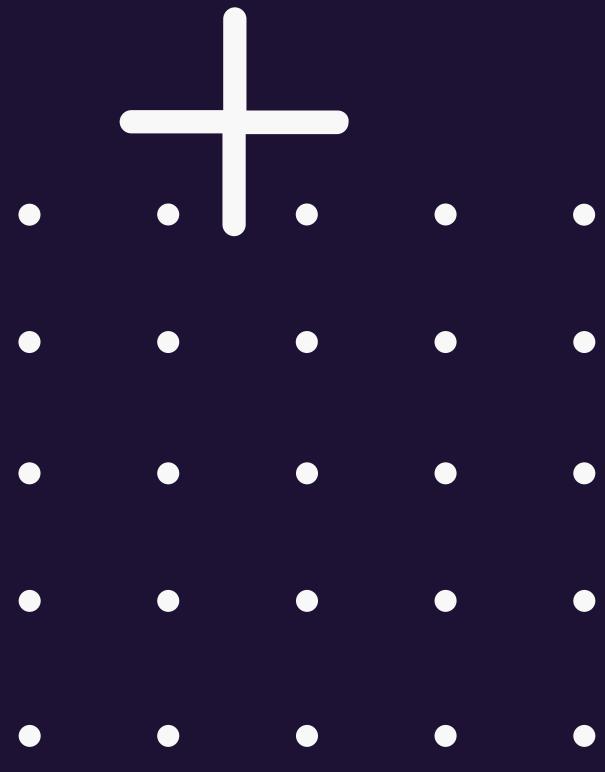
The Cocke–Younger–Kasami–Algorithm (CYK or CKY) is a highly efficient parsing algorithm for context-free grammars. This makes it ideal to decide the word-problem for context-free grammars, given in Chomsky normal form (CNF). The following tool can be used to check if a certain word  $w \in \Sigma^*$  is part of a language, given in CNF grammar.

## Algoritmo CYK

W

El algoritmo de Cocke–Younger–Kasami (CYK) determina si una cadena puede ser generada por una gramática libre de contexto y, si es posible, cómo puede ser generada. Este proceso es conocido como análisis sintáctico de la cadena. El algoritmo es un...

W Wikipedia / Nov 13, 2019



## CYK Algorithm



The Cocke–Younger–Kasami-Algorithm (CYK or CKY) is a highly efficient parsing algorithm for context-free grammars. This makes it ideal to decide the word-problem for context-free grammars, given in Chomsky normal form (CNF).

It uses a dynamic programming algorithm to tell whether a string is in the language of a grammar. The following page can be used to check if a certain sentence  $w \in \Sigma^*$  is part of a language, given in CNF grammar, showing a:

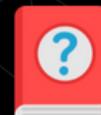
Confirmation message .

Error message .

Warning message and respective instructions. .

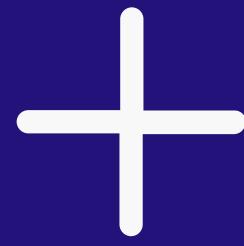
### Algorithm CYK

```
Let the input string consist of n letters,  $a_1 \dots a_n$ .
Let the grammar contain r terminal and nonterminal symbols  $R_1 \dots R_r$ .
This grammar contains the subset  $R_0$  which is the set of start symbols.
Let  $P[n,n,r]$  be an array of booleans. Initialize all elements of P to
false.
For each i = 1 to n
    For each unit production  $R_j \rightarrow a_i$ , set  $P[i,1,j] = true$ .
For each i = 2 to n -- Length of span
    For each j = 1 to n-i+1 -- Start of span
        For each k = 1 to i-1 -- Partition of span
            For each production  $R_A \rightarrow R_B R_C$ 
                If  $P[j,k,B] \text{ and } P[j+k,i-k,C]$  then set  $P[j,i,A] = true$ 
            If any of  $P[1,n,x]$  is true ( $x$  is iterated over the set s, where s are
            all the indices for  $R_0$ )
                Then string is member of language
                Else string is not member of language
```



# Link:

[https://yonosoysantiago.github.io/CYK\\_Algorithm/](https://yonosoysantiago.github.io/CYK_Algorithm/)



# CYK Algorithm

Sentence:

bca

Grammar (must be in FNC):

Write Grammar in Chomsky's normal form  
(You can use '\*' to represent void)

Example:

$S \rightarrow BA|AB$   
 $A \rightarrow CA|a$   
 $B \rightarrow BB|b$   
 $C \rightarrow BA|c$

please make sure your grammar follows  
the example format

Check

[github](#)

## 1 Step

Insert the sentence for validate  
grammar



# CYK Algorithm

Sentence:

bca

Grammar (must be in FNC):

```
S->BA|AB  
A->CA|a  
B->BB|b  
C->BA|c
```

Check

[github](#)

## Step 2

Insert the grammar in CNF form

The grammar must be without spaces and also the separators must be " | " and "->" to represents the arrow.

[https://es.wikipedia.org/wiki/Algoritmo\\_CYK](https://es.wikipedia.org/wiki/Algoritmo_CYK)

- CYK ALGORITHM recognizes languages defined by a context-free grammar written in Chomsky Normal Form (CNF).

A formal grammar is in Chomsky Normal Form if all its production rules are of any of the following forms:

$A \rightarrow BC$  or

$A \rightarrow a$

where  $A$ ,  $B$  and  $C$  they are nonterminal symbols (or variables) and  $a$  is a terminal symbol.

[https://es.wikipedia.org/wiki/Forma\\_normal\\_de\\_Chomsky](https://es.wikipedia.org/wiki/Forma_normal_de_Chomsky)

## Conditions for grammar

# CYK Algorithm

Sentence:

bca

Grammar (must be in FNC):

```
S->BA|AB  
A->CA|a  
B->BB|b  
C->BA|c
```

Check

[github](#)

## Step 3

Pulse the boton check for validate the algorithm of cyk

# CYK Algorithm

Sentence:

bca

Grammar (must be in FNC):



Great

This string is generated by the grammar

OK

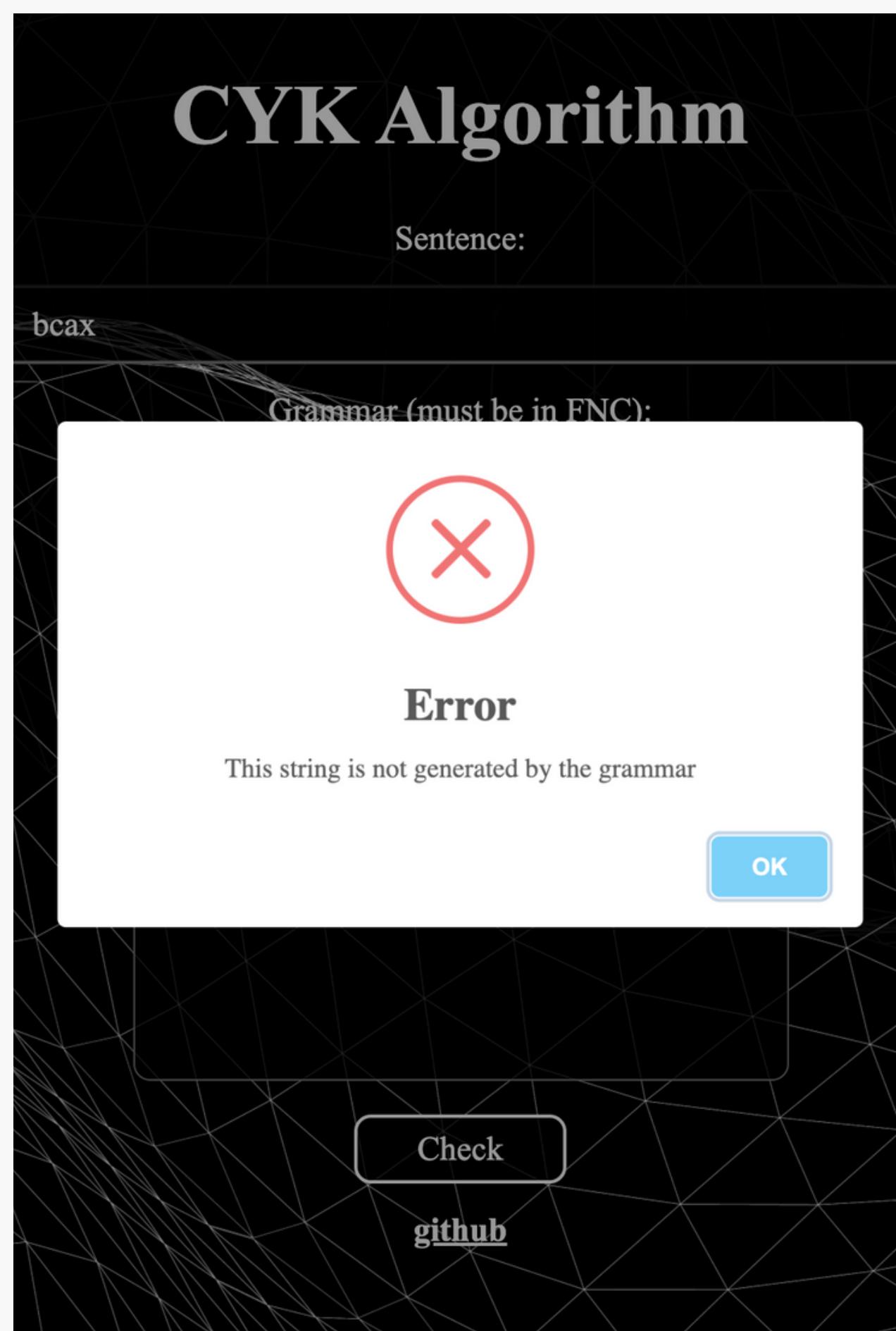
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github

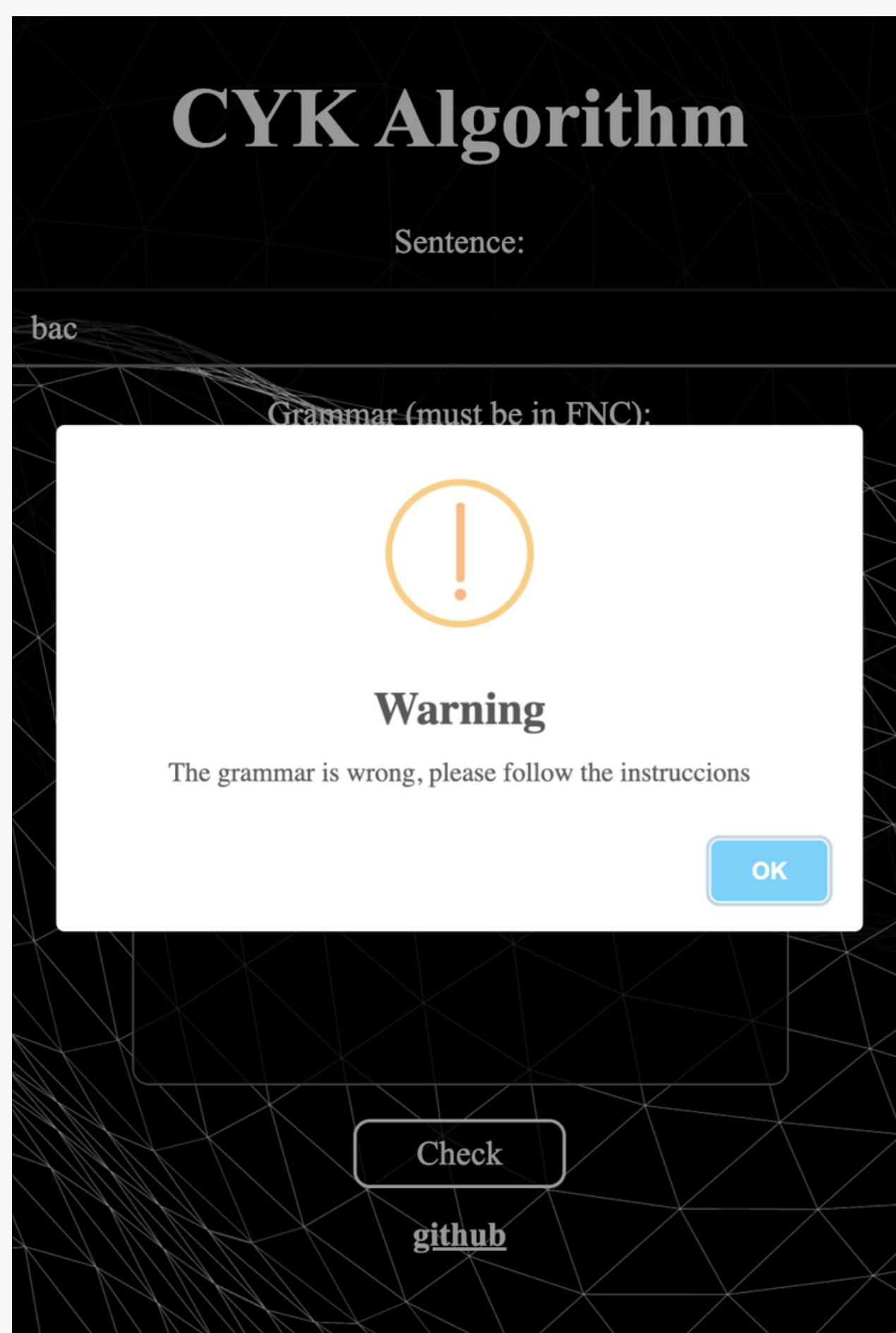
## Step 4

The program  
It will show a message of good, bad  
or warning.

# Error alert



# Warning alert





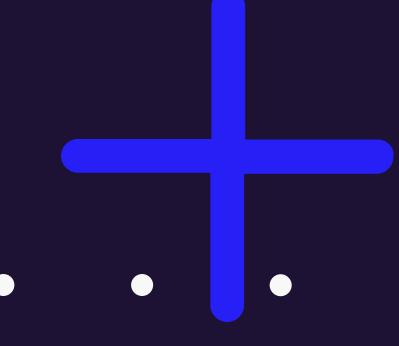
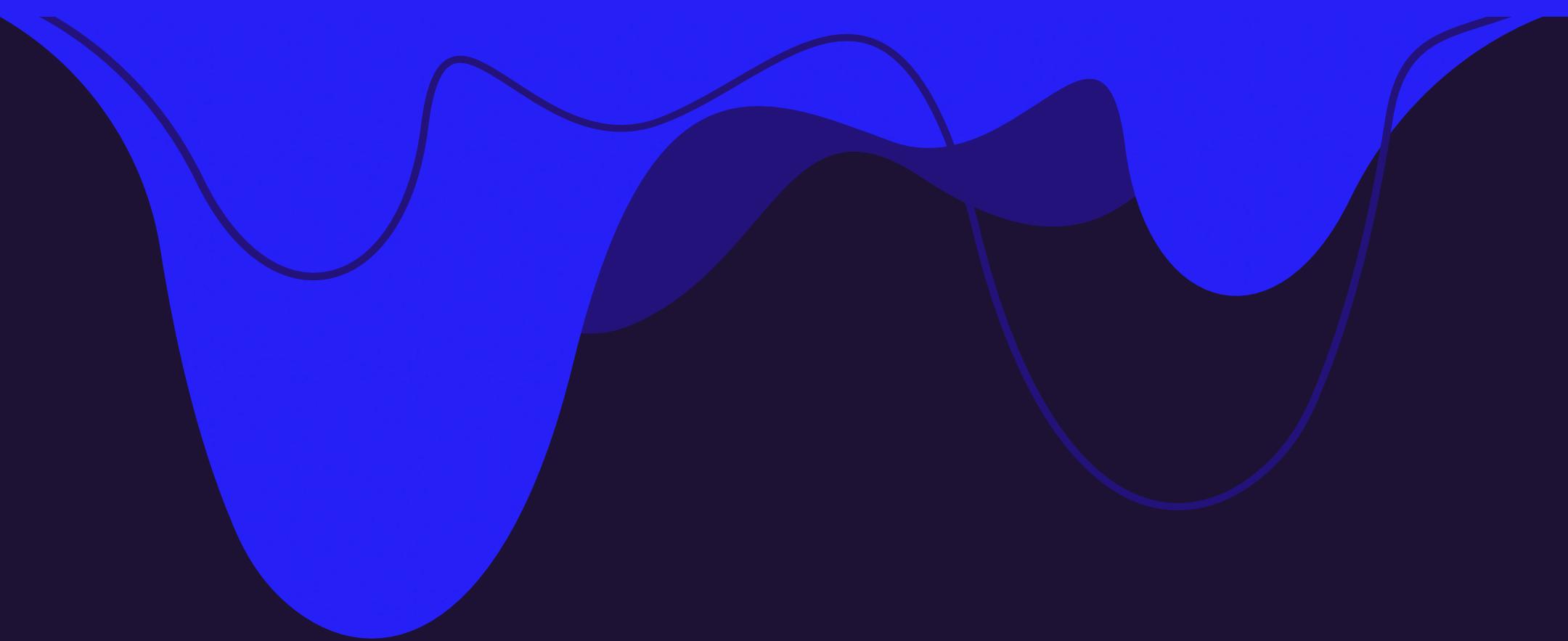
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