

# Progettazione di una Struttura Dati per Rappresentare e Analizzare Collezioni di Sogni

**Marco Caputo**

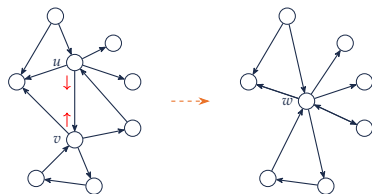
marco.caputo@studenti.unicam.it



22 Luglio 2024

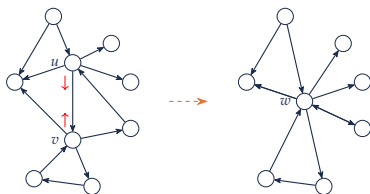
# CONTRAZIONE DI GRAFI

## ContraZIONE di archi

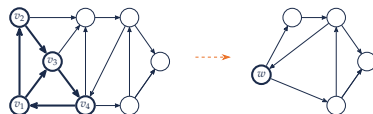


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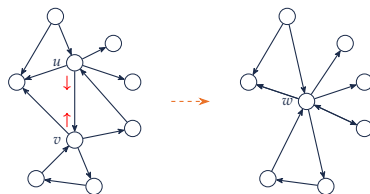


## ContraZIONE di sottografi

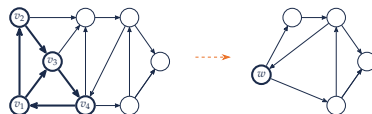


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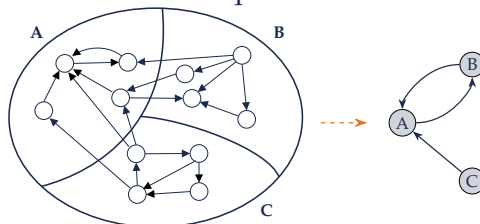
## ContraZIONE di archi



## ContraZIONE di sottografi



## Grafo quoziente



# GRAFO MULTI-LIVELLO

## Definizione (Grafo multi-livello)

Un **grafo multi-livello**  $M$  è una coppia  $(G, \Gamma)$  dove:

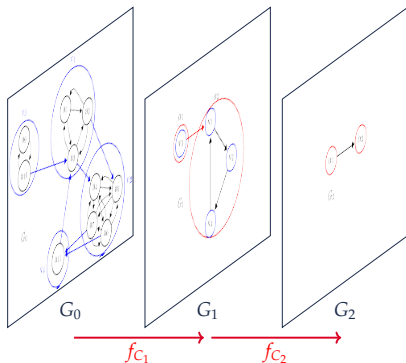
- ▶  $G = (V, E)$  è un grafo;
- ▶  $\Gamma = \langle f_{C_1}, f_{C_2}, \dots, f_{C_k} \rangle$  è una sequenza di funzioni di contrazione.

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# GRAFO DECONTRAIBILE

## Definizione (Grafo decontraibile)

Un **grafo decontraibile** è una quadrupla  $G = (V, E, dec_V, dec_E)$  dove:

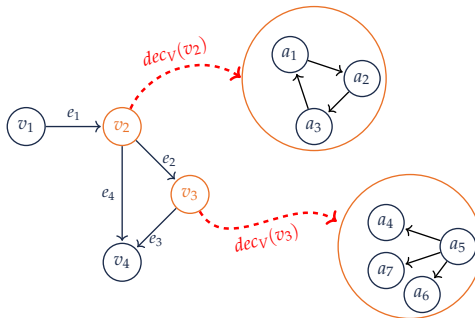
- ▶  $V$  è un insieme di elementi detti **supernodi**;
- ▶  $E \subseteq V \times V$  è un insieme di coppie ordinate di supernodi, dette **superarchi**;
- ▶  $dec_V : V \rightarrow \mathcal{G}_D$  è una funzione tale per cui  $dec_V(v) = (\mathcal{V}_v, \mathcal{E}_v, dec_{\mathcal{V}_v}, dec_{\mathcal{E}_v})$  è un grafo decontraibile rappresentato dal supernodo  $v$ ;
- ▶  $dec_E : E \rightarrow (\mathcal{V} \times \mathcal{V})$  con  $\mathcal{V} = \bigcup_{v \in V} \mathcal{V}_v$ , è una funzione tale per cui  $\forall e = (u, v), dec_E(e) = \mathcal{E}_e \subseteq \{(a, b) \mid a \in \mathcal{V}_u \wedge b \in \mathcal{V}_v\}$  è un insieme di archi rappresentati dal superarco  $e$ .

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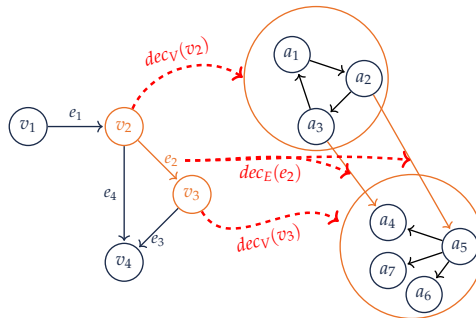


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# SCHEMI DI CONTRAZIONE

SCHEMA

ALGORITMO

COMPLESSITÀ

## SCHEMI DI CONTRAZIONE

SCHEMA

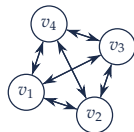
ALGORITMO

COMPLESSITÀ

Cricche

Algoritmo di  
Bron-Kerbosch

$$O(3^{\frac{n}{3}})$$



## SCHEMI DI CONTRAZIONE

## SCHEMA

## ALGORITMO

## COMPLESSITÀ

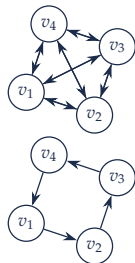
Cricche

Algoritmo di  
Bron-Kerbosch

$$O(3^{\frac{n}{3}})$$

Circuiti  
sempliciAlgoritmo dei  
circuiti semplici  
di Johnson

$$O((n + m) c)$$



## SCHEMI DI CONTRAZIONE

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## ALGORITMO

## COMPLESSITÀ

Cricche

Algoritmo di  
Bron-Kerbosch

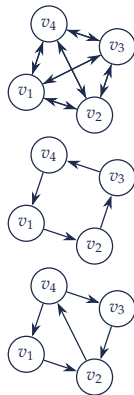
$$O(3^{\frac{n}{3}})$$

Circuiti  
sempliciAlgoritmo dei  
circuiti semplici  
di Johnson

$$O((n + m) c)$$

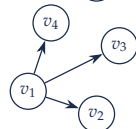
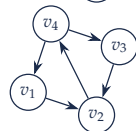
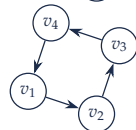
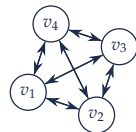
Componenti  
fortemente  
connesseAlgoritmo di  
Kosaraju-Sharir

$$O(n + m)$$

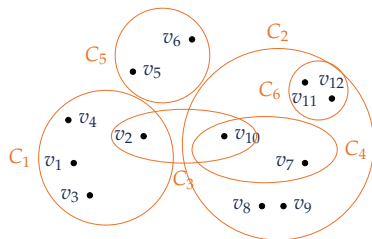


## SCHEMI DI CONTRAZIONE

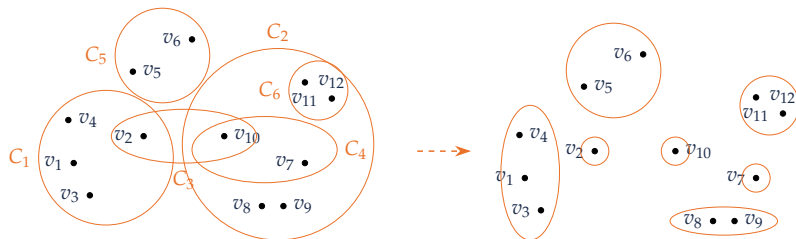
| SCHEMA                         | ALGORITMO                                  | COMPLESSITÀ          |
|--------------------------------|--|----------------------|
| Cricche                        | Algoritmo di Bron-Kerbosch                 | $O(3^{\frac{n}{3}})$ |
| Circuiti semplici              | Algoritmo dei circuiti semplici di Johnson | $O((n + m) c)$       |
| Componenti fortemente connesse | Algoritmo di Kosaraju-Sharir               | $O(n + m)$           |
| Stelle                         | Algoritmo custom                           | $O(n + m)$           |



# CONTRAZIONE DI SOTTOINSIEMI

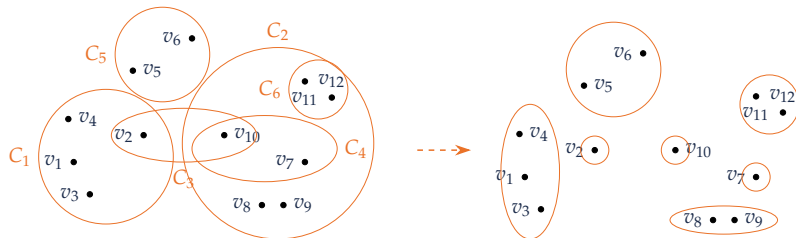


# CONTRAZIONE DI SOTTOINSIEMI



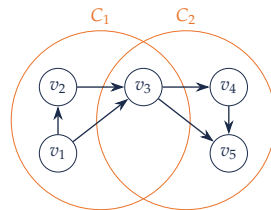


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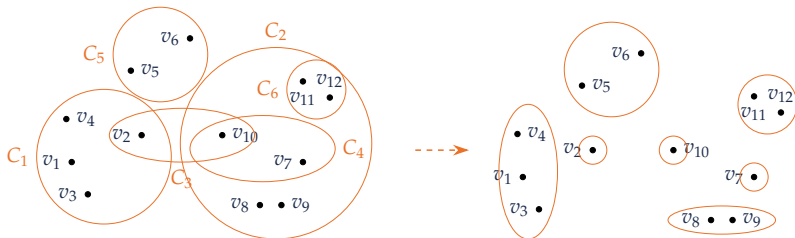


$T$

|       |                |
|-------|----------------|
| $v_1$ | $\{C_1\}$      |
| $v_2$ | $\{C_1\}$      |
| $v_3$ | $\{C_1, C_2\}$ |
| $v_4$ | $\{C_2\}$      |
| $v_5$ | $\{C_2\}$      |



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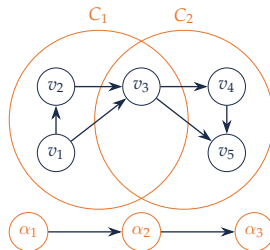


$T$

|       |                |
|-------|----------------|
| $v_1$ | $\{C_1\}$      |
| $v_2$ | $\{C_1\}$      |
| $v_3$ | $\{C_1, C_2\}$ |
| $v_4$ | $\{C_2\}$      |
| $v_5$ | $\{C_2\}$      |

$T'$

|                |            |
|----------------|------------|
| $\{C_1\}$      | $\alpha_1$ |
| $\{C_1, C_2\}$ | $\alpha_2$ |
| $\{C_2\}$      | $\alpha_3$ |



# ANALISI SINTATTICA DEI SOGNI

*"I am at a lake in my hometown. Something is going on there and we are in a hurry to get away. We get in a station wagon and have a hard time getting two pet deer, with the same names as my son and daughter, corralled. Finally we get them into the vehicle and we are almost all the way out when the wheel goes off one side of the road and the vehicle is stuck and the deer is about halfway out. At this point I notice my mother-in-law is cutting off a Christmas tree which is growing in the water at the end of the dock."*

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RIMOZIONE  
STOPWORDS

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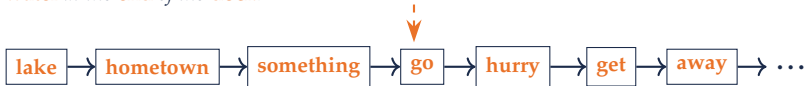
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RIMOZIONE  
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LEMMATIZ-  
ZAZIONE

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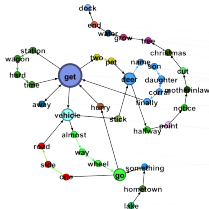
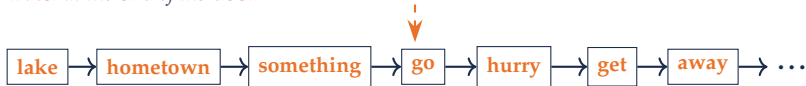
RIMOZIONE  
STOPWORDS  
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ZAZIONE



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RIMOZIONE  
STOPWORDS  
LEMMATIZ-  
ZAZIONE

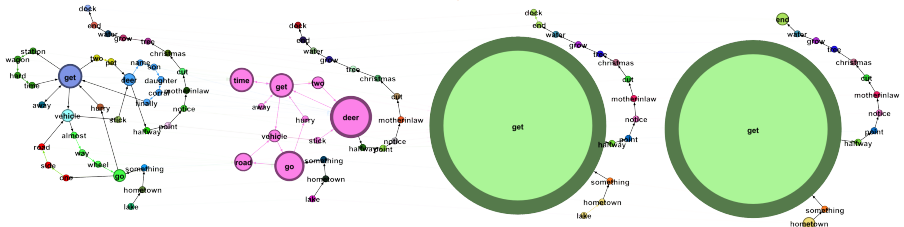
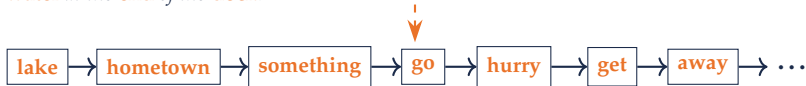


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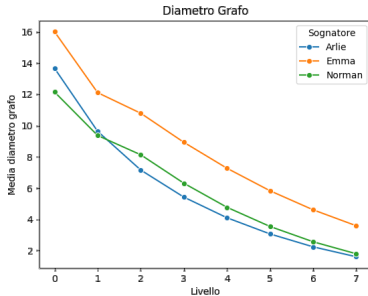
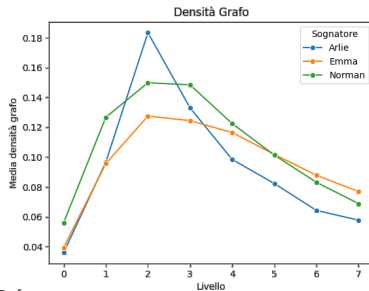
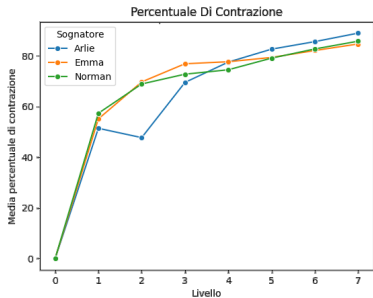
RIMOZIONE  
STOPWORDS

LEMMA-  
TIZ-  
ZAZIONE



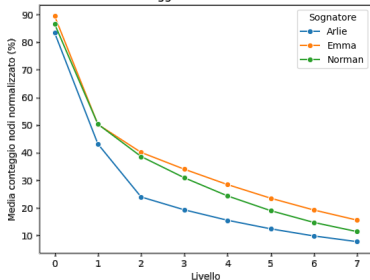


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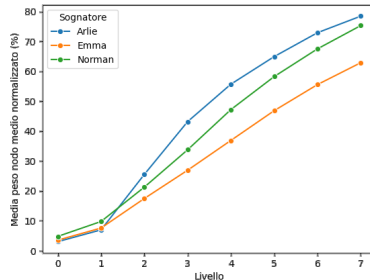


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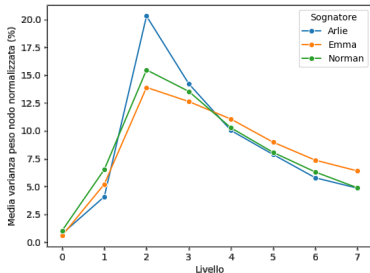
Conteggio Nodi Normalizzato



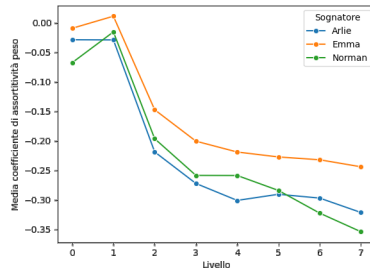
Peso Nodo Medio Normalizzato



Varianza Peso Nodo Normalizzata



Coefficiente Di Assortività Peso



## ACKNOWLEDGEMENTS

