

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

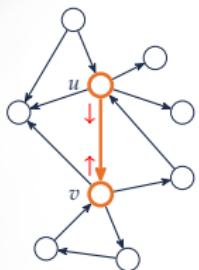
Marco Caputo
marco.caputo@studenti.unicam.it



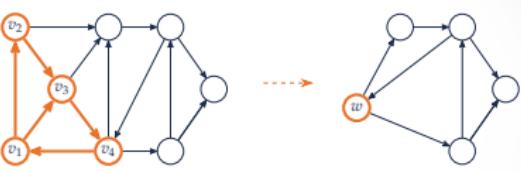
22 Luglio 2024

CONTRAZIONE DI GRAFI

Contrazione di archi

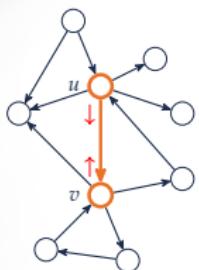


Contrazione di sottografi

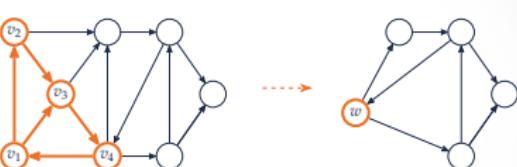


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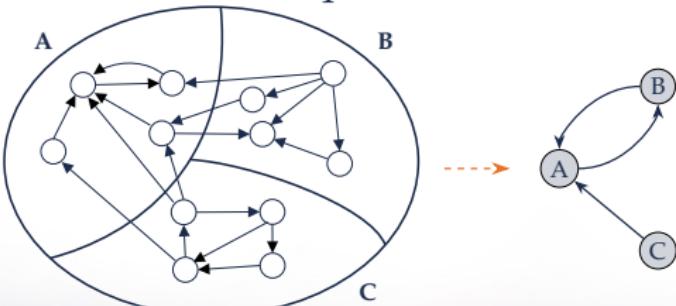
Contrazione di archi



Contrazione di sottografi



Grafo quoziante



GRAFO MULTI-LIVELLO

Definizione (Grafo multi-livello)

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

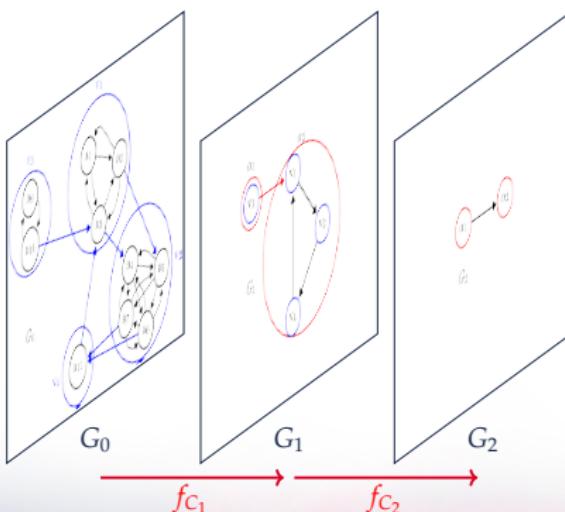
- $G = (V, E)$ è un grafo;
- $\Gamma = \langle f_{C_1}, f_{C_2}, \dots, f_{C_k} \rangle$ è una sequenza di funzioni di contrazione.

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GRAFO DECONTRAIBILE

Definizione (Grafo decontraibile)

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

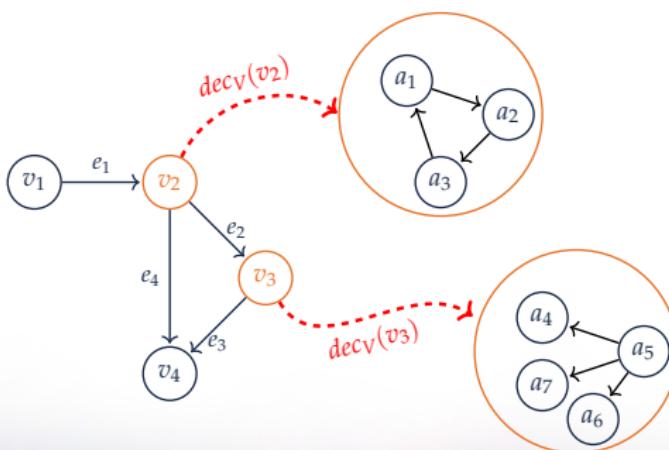
- ▶ V è un insieme di elementi detti **supernodi**;
- ▶ $E \subseteq V \times V$ è un insieme di coppie ordinate di supernodi, dette **superarchi**;
- ▶ $dec_V : V \rightarrow \mathcal{G}_D$ è una funzione tale per cui $dec_V(v) = (\mathcal{V}_v, \mathcal{E}_v, dec_{\mathcal{V}_v}, dec_{\mathcal{E}_v})$ 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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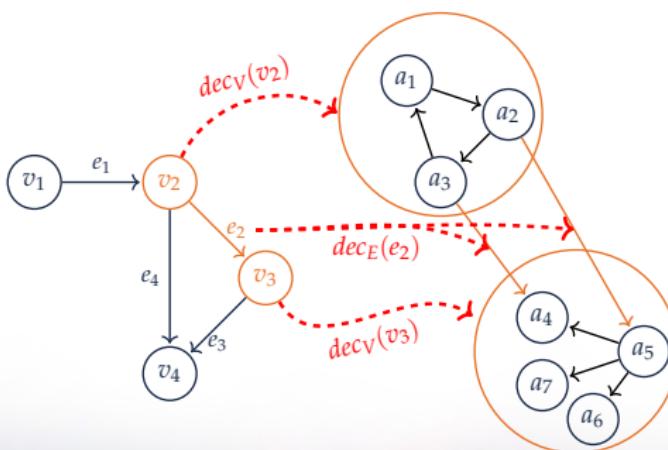


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DEFINIZIONI
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CONTRAZIONE
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ANALISI SINTATTICA DEI SOGNI
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ANALISI SEMANTICA DEI SOGNI
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CONCLUSIONI
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SCHEMI DI CONTRAzione

SCHEMA

ALGORITMO

COMPLESSITÀ

SCHEMI DI CONTRAzione

SCHEMA

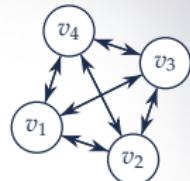
Cricche

ALGORITMO

Algoritmo di
Bron-Kerbosch

COMPLESSITÀ

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



SCHEMI DI CONTRAzione

SCHEMA

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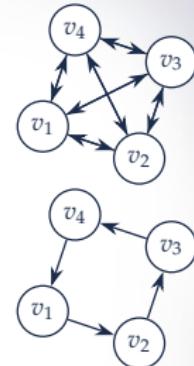
COMPLESSITÀ

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Circuiti
semplici

Algoritmo dei
circuiti semplici
di Johnson

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



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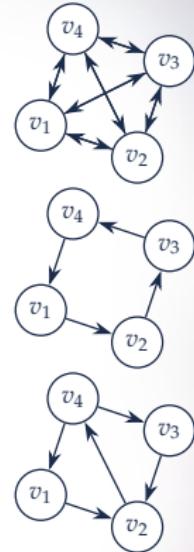
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Componenti
fortemente
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Algoritmo di
Kosaraju-Sharir

$$O(n + m)$$



SCHEMI DI CONTRAzione

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Cricche

Circuiti semplici

Componenti fortemente connesse

Stelle

ALGORITMO

Algoritmo di Bron-Kerbosch

Algoritmo dei circuiti semplici di Johnson

Algoritmo di Kosaraju-Sharir

Algoritmo custom

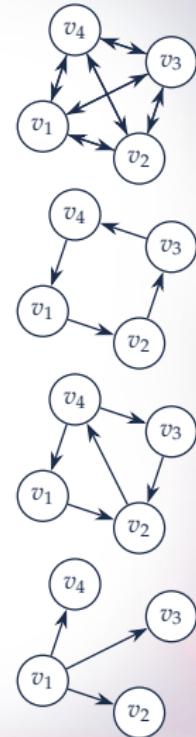
COMPLESSITÀ

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

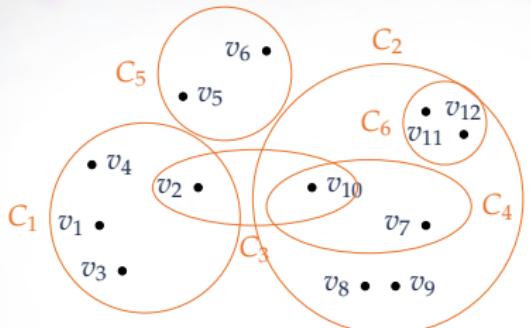
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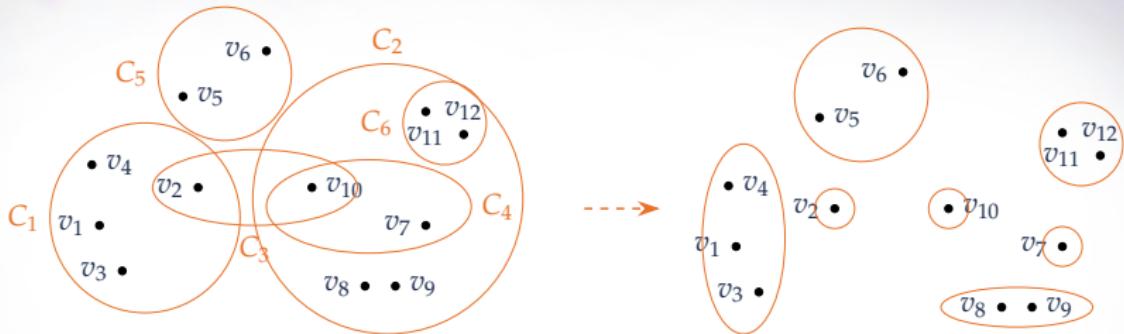
$O(n + m)$



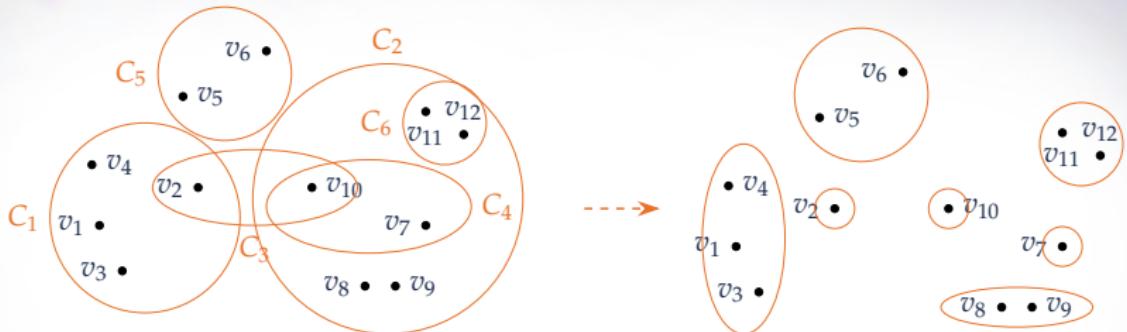
CONTRAZIONE DI SOTTOINSIEMI



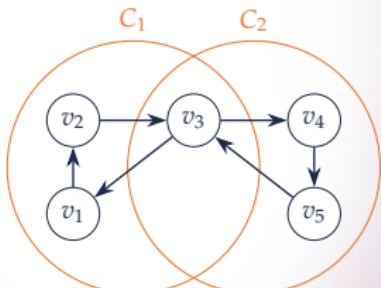
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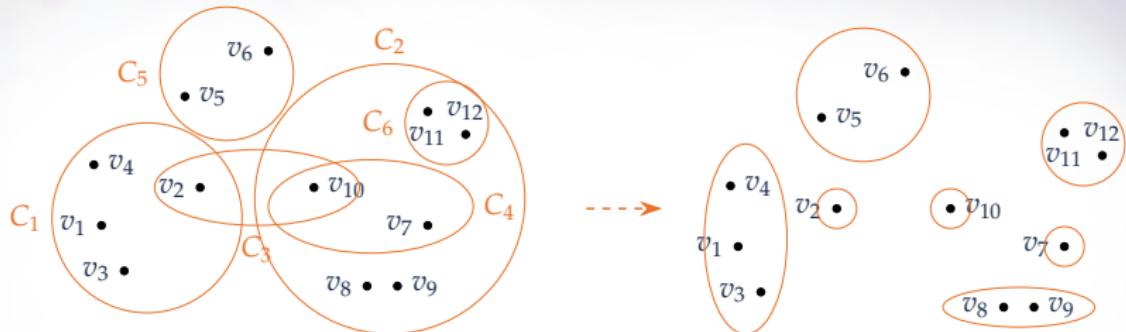
CONTRAZIONE DI SOTTOINSIEMI

 T

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



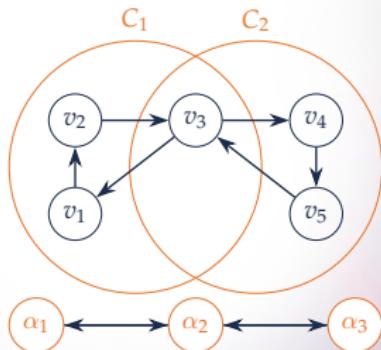
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 T'

$\{C_1\}$	α_1
$\{C_1, C_2\}$	α_2
$\{C_2\}$	α_3



ANALISI SINTATTICA DEI SOGNI

Si vuole esaminare la struttura sintattica tipica dei singoli sogni di un particolare sognatore, con possibili risvolti legati alla salute mentale.

UN SOGNO DI ARLIE

"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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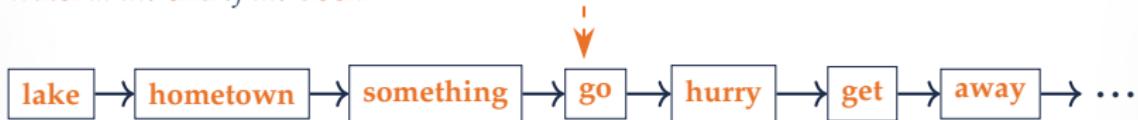
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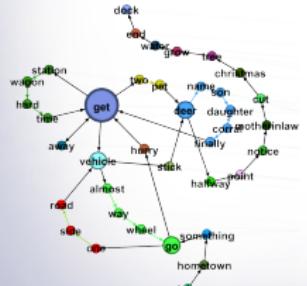
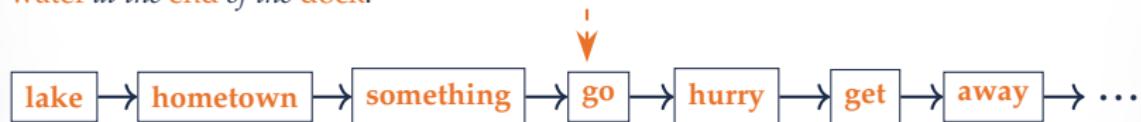
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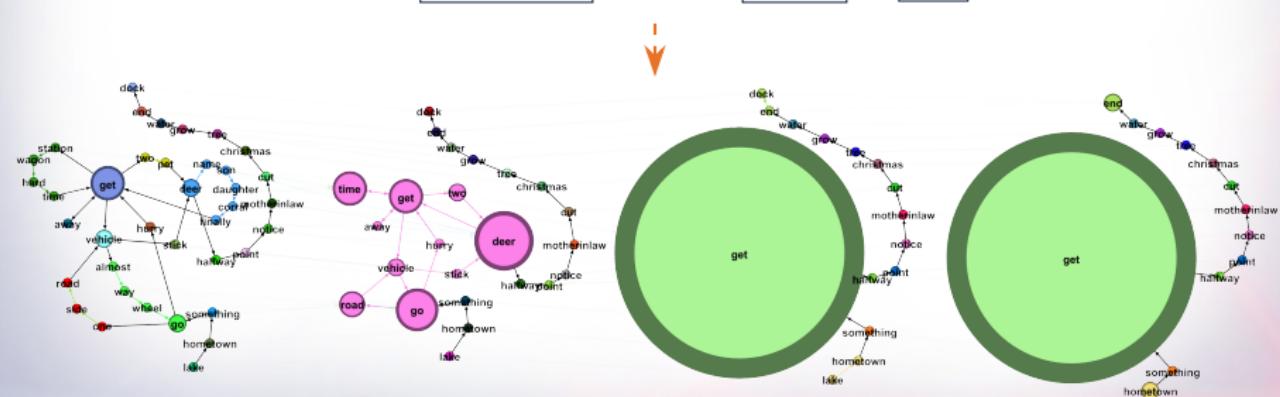
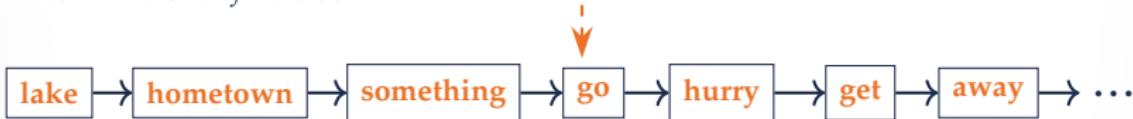
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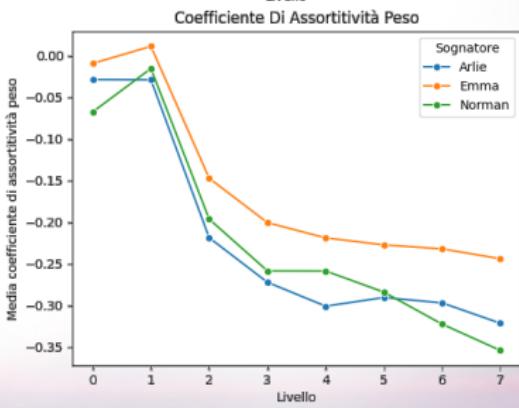
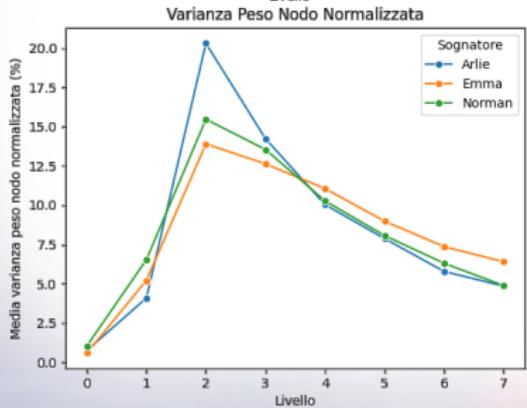
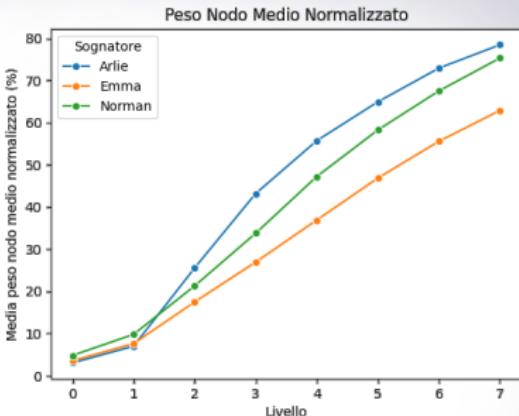
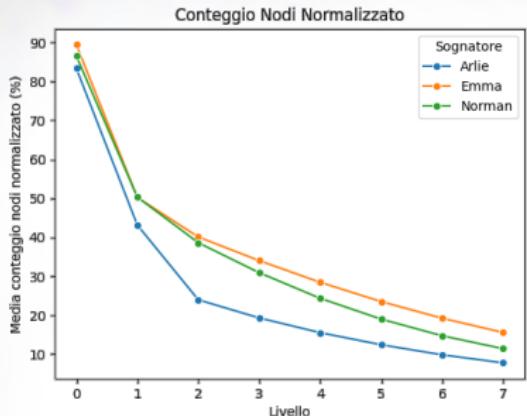
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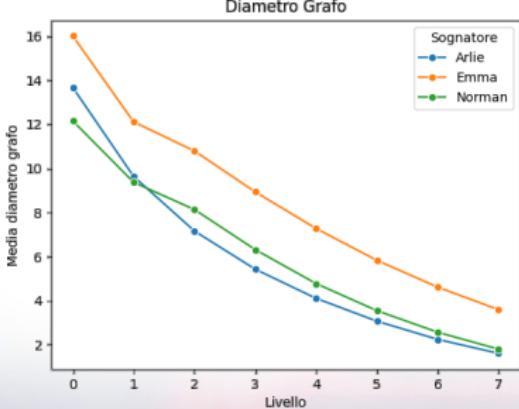
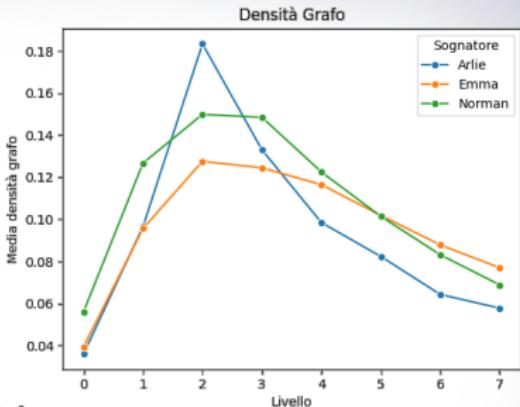
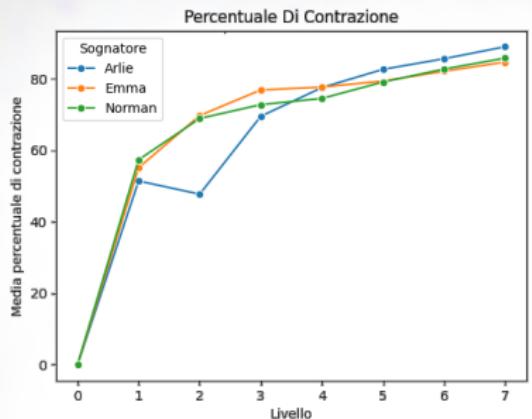


RIMOZIONE
STOPWORDS
LEMMATIZ-
ZAZIONE

RISULTATI DI ARLIE, EMMA E NORMAN



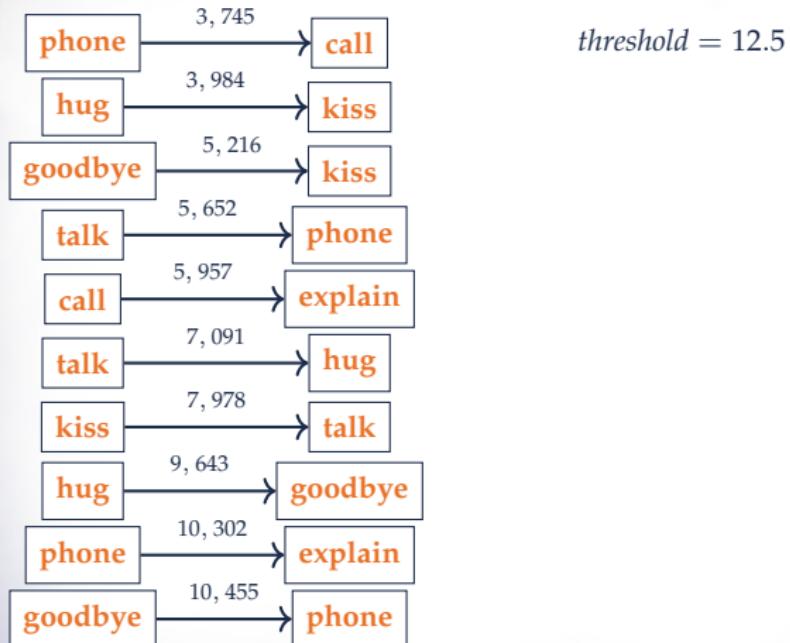
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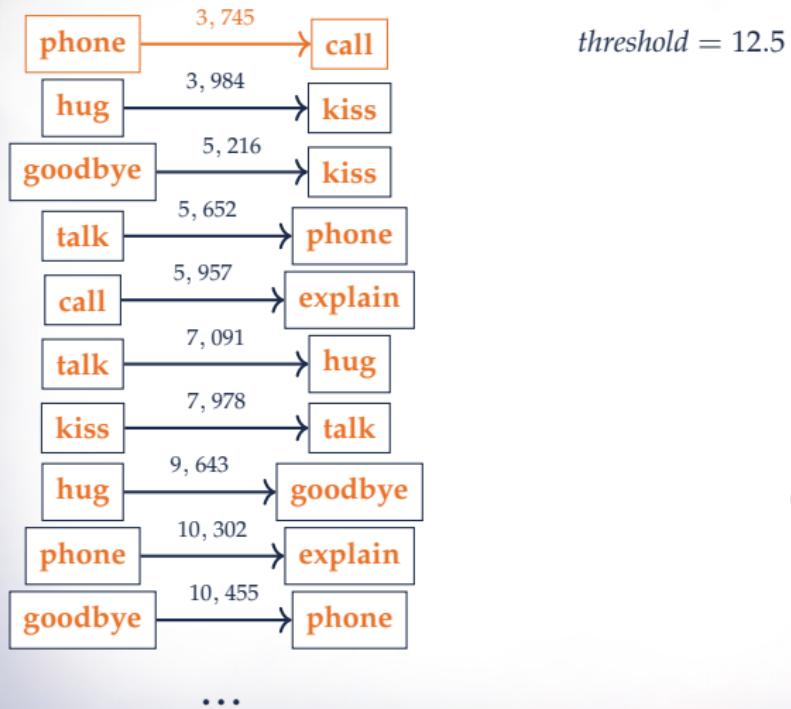
ANALISI SEMANTICA DEI SOGNI

Si vuole costruire uno spazio semantico di parole a più livelli che rappresenti le tematiche di una collezione di sogni di un particolare sognatore.

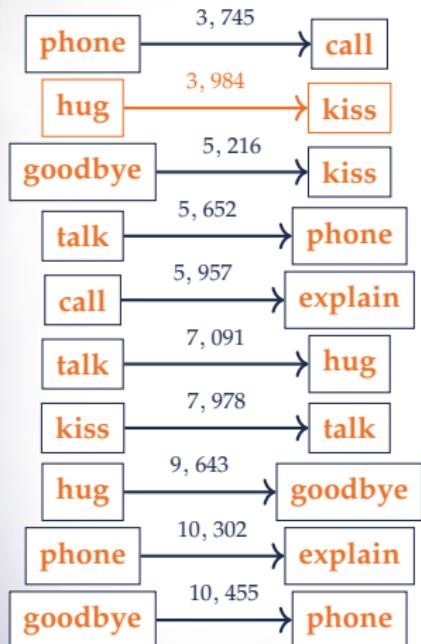
RIDUZIONE DELLA CONNETTIVITÀ



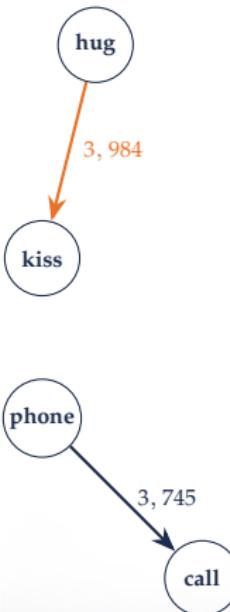
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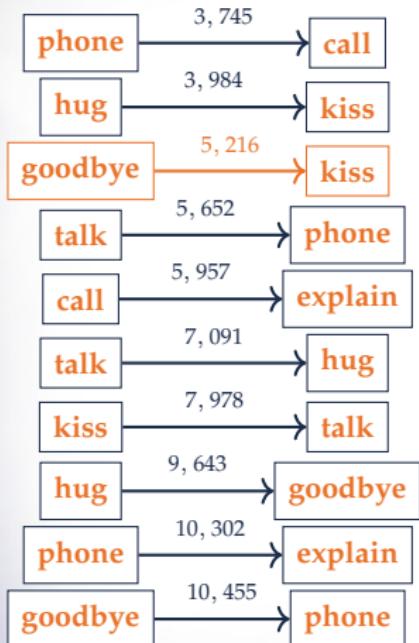
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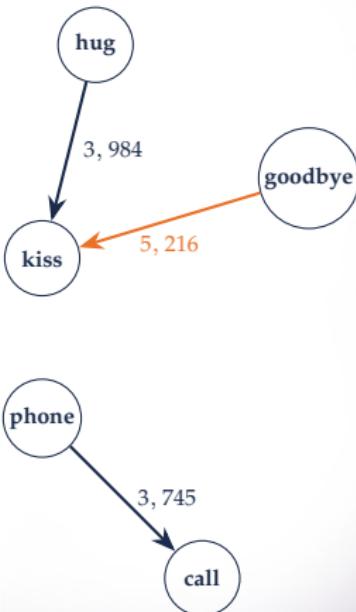
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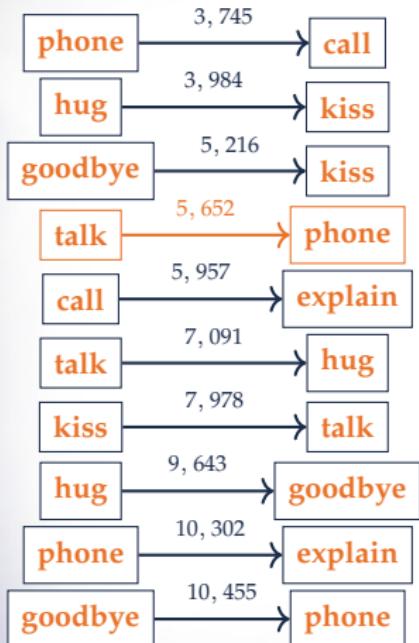
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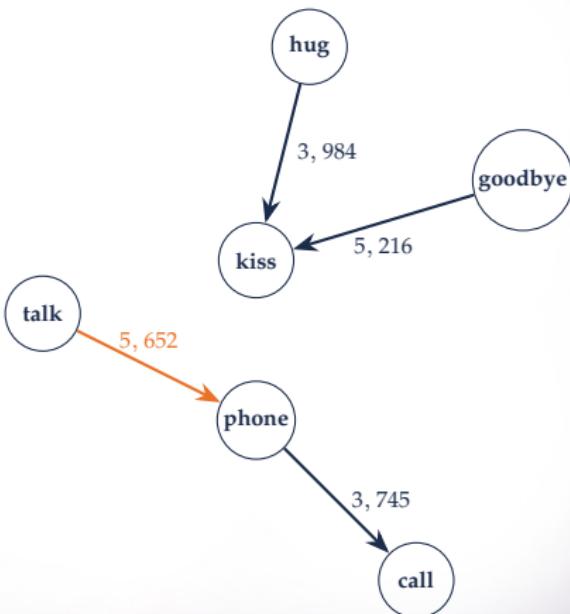
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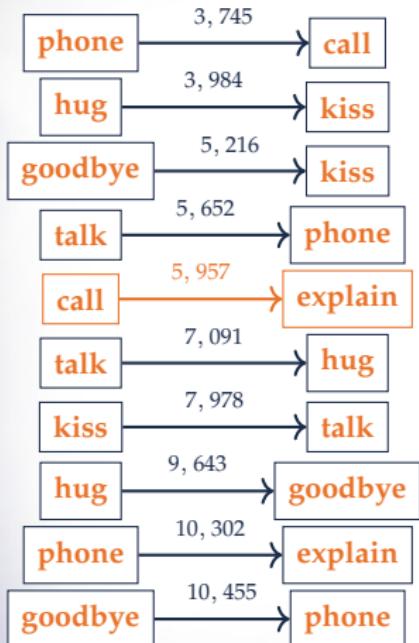
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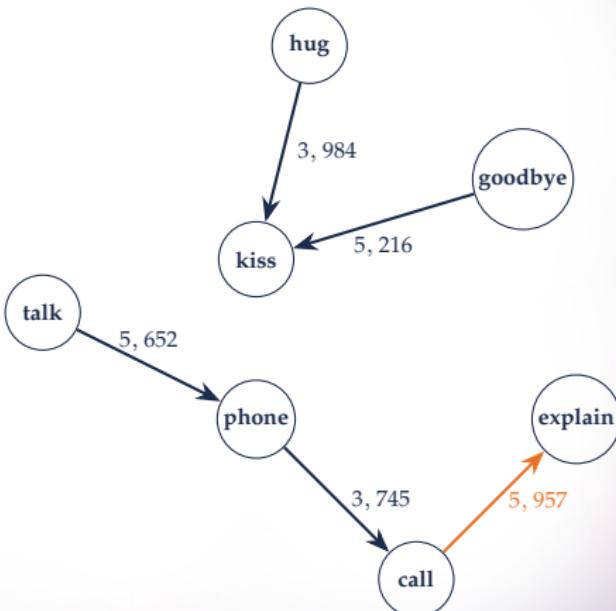
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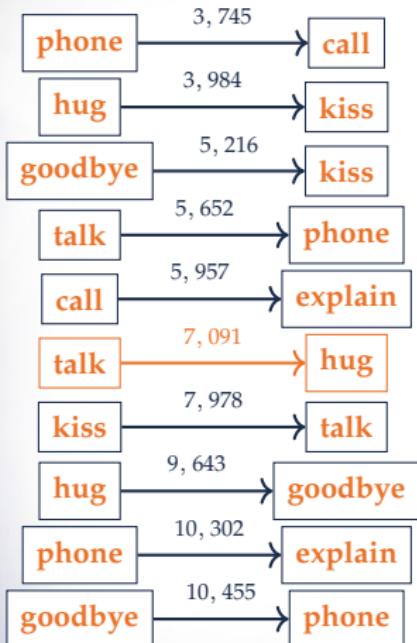
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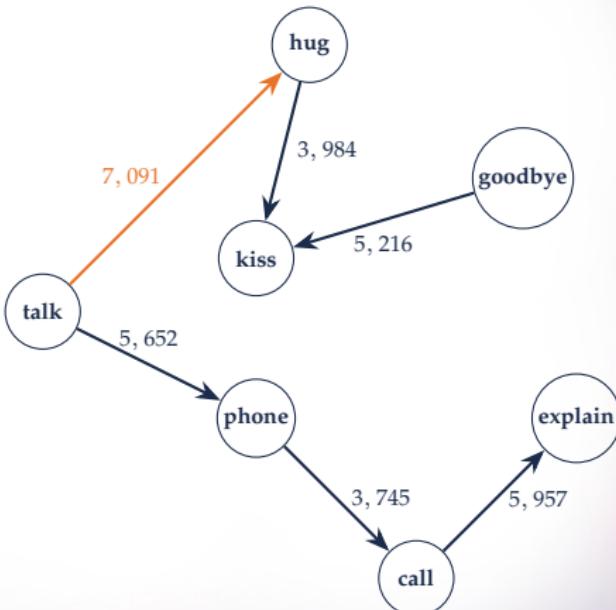


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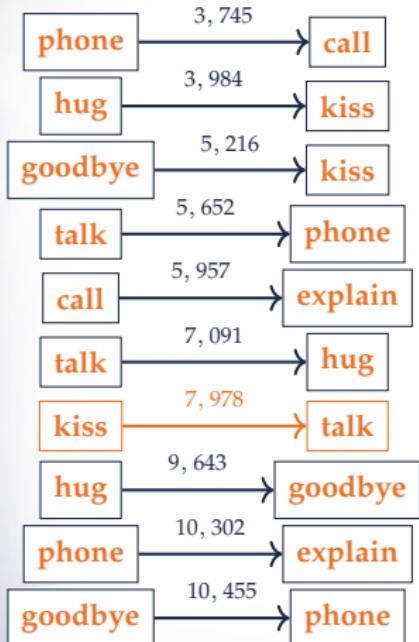


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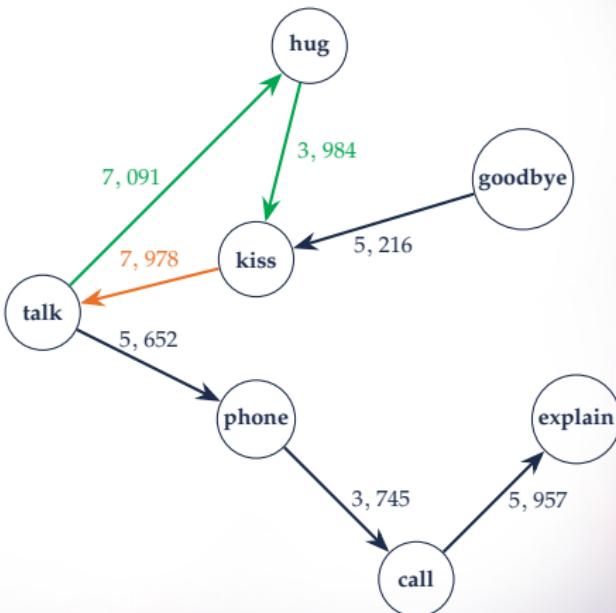


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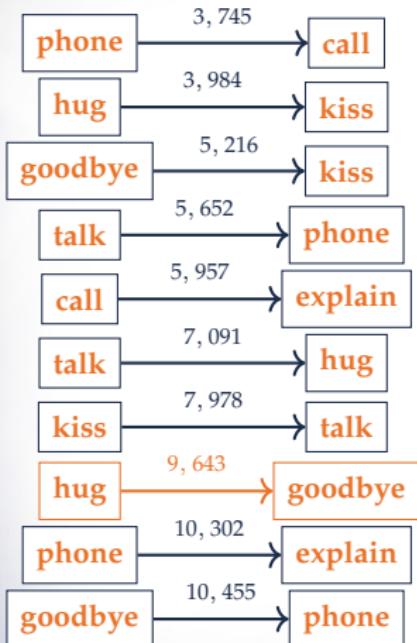


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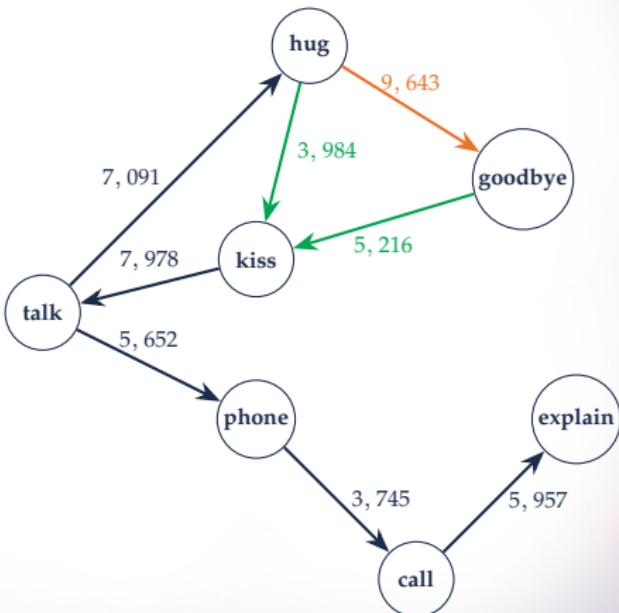
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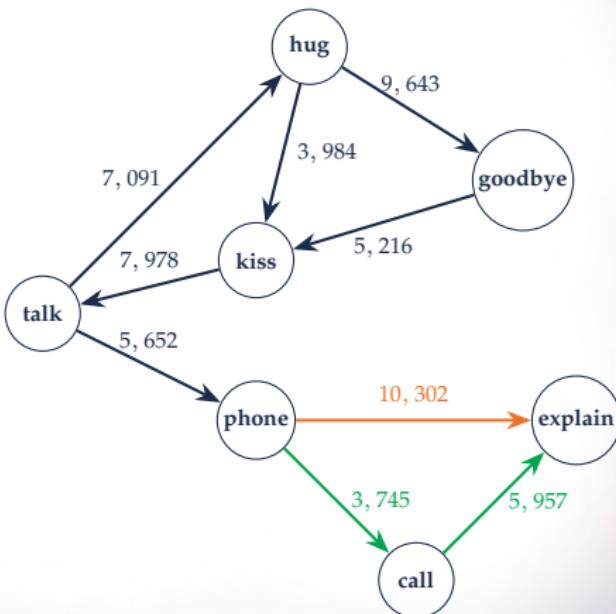
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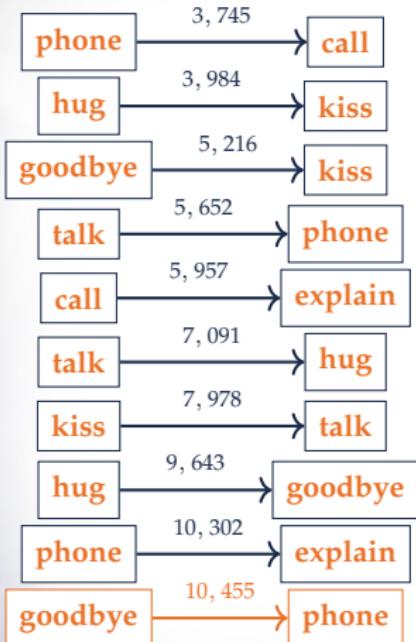
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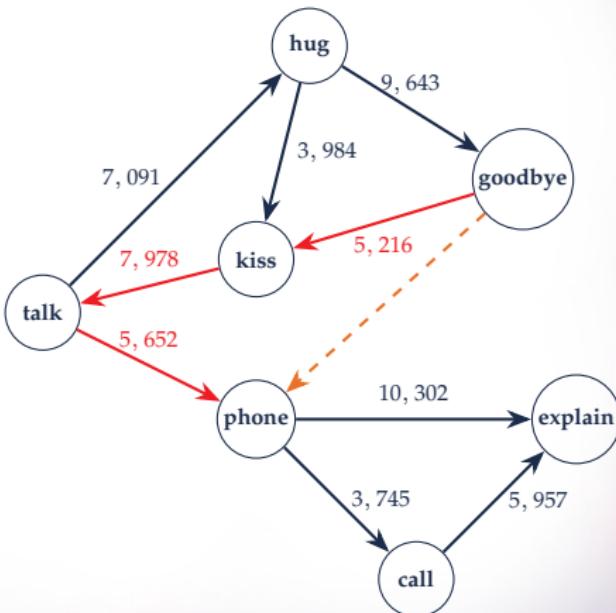
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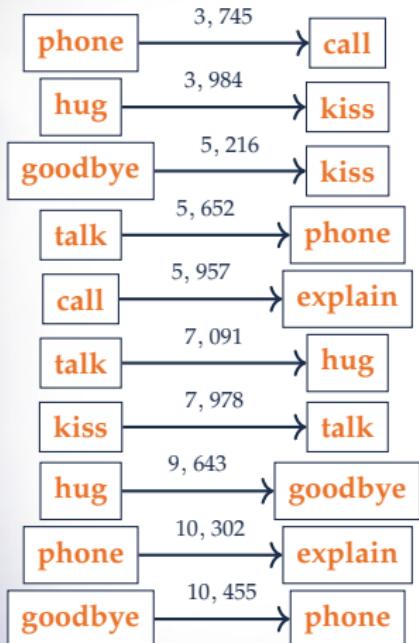
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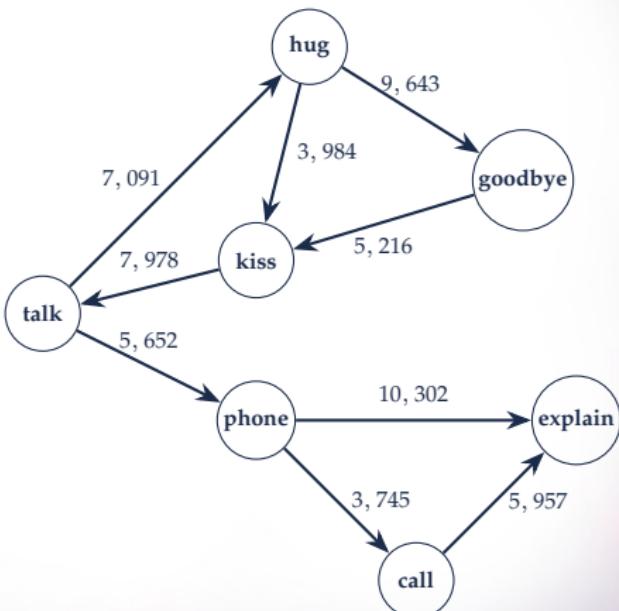
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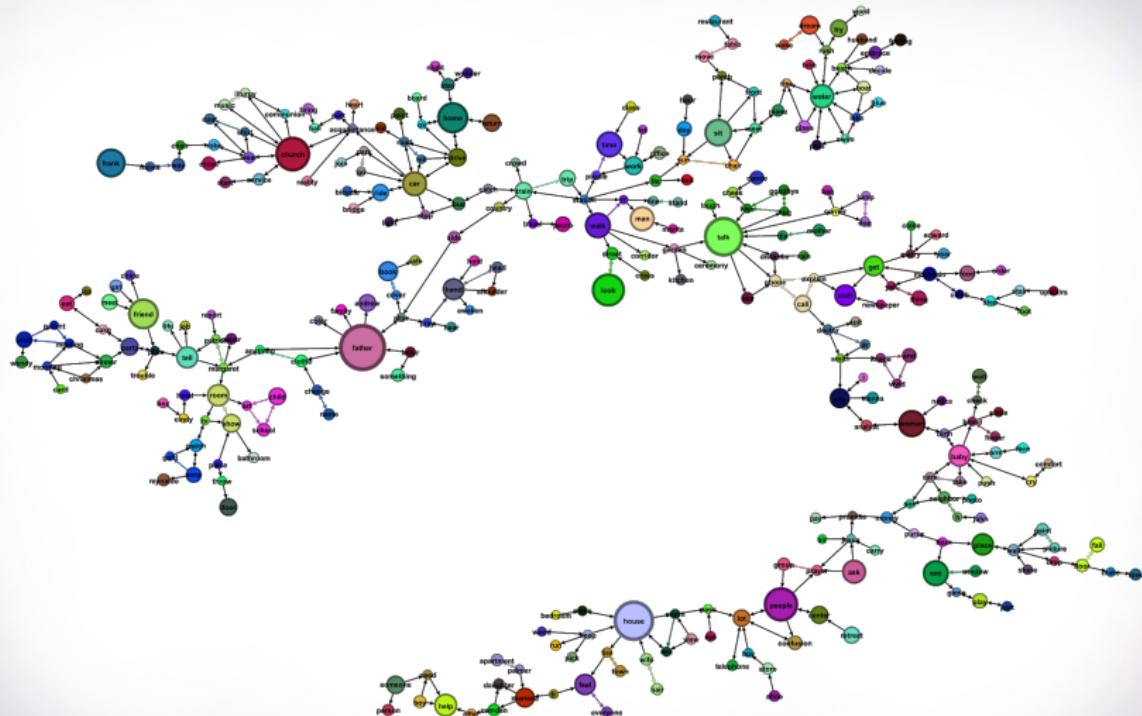


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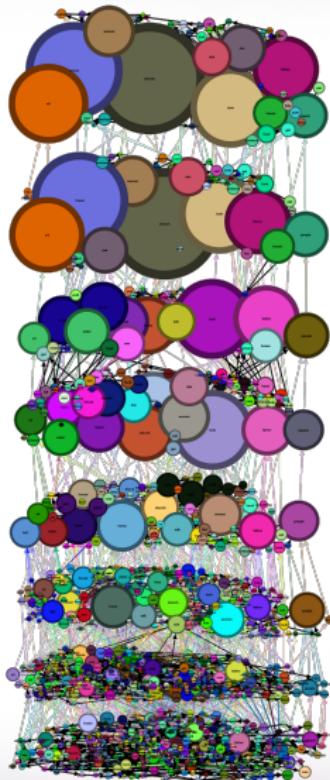


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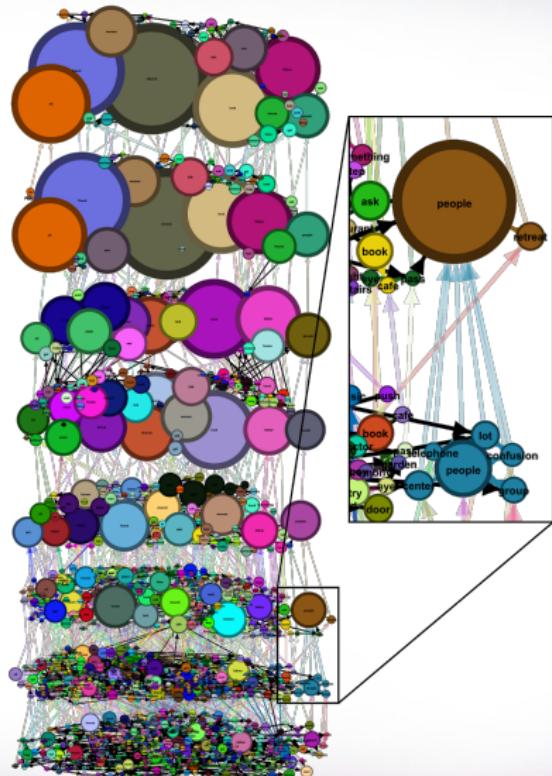
GRAFO DI EMMA



GRAFO MULTI-LIVELLO DI EMMA



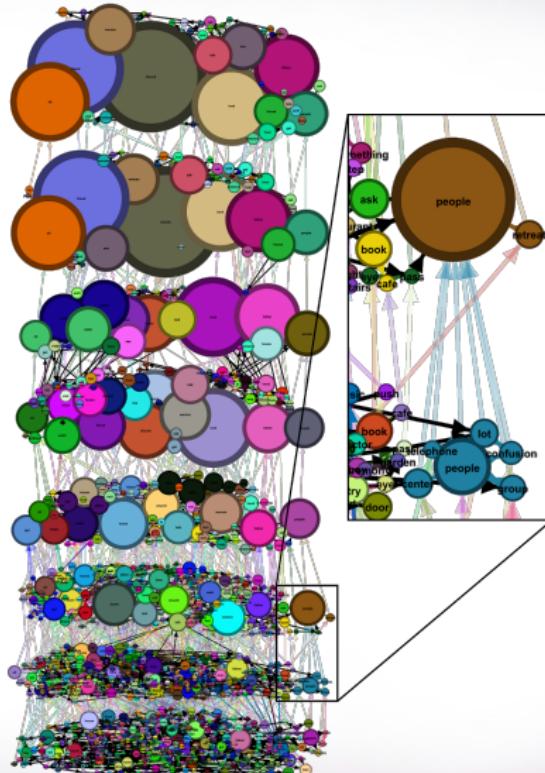
GRAFO MULTI-LIVELLO DI EMMA



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ESEMPI DI CIRCUITI

- ▶ “cake”-“party”
- ▶ “boat”-“lake”-“water”
- ▶ “trip”-“train”-“station”
- ▶ “road”-“car”-“drive”-“hill”
- ▶ “liturgy”-“church”-“music”



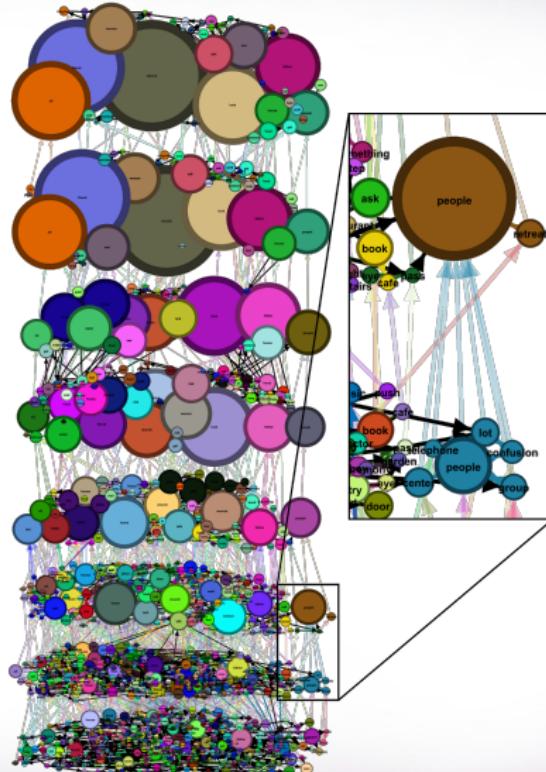
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ESEMPI DI SCC

- ▶ “sit”-“chair”-“front”-
“porch”-“seat”-“plane”
- ▶ “lake”-“boat”-“water”-“rise”-
“pool”-“swim”-“rush”



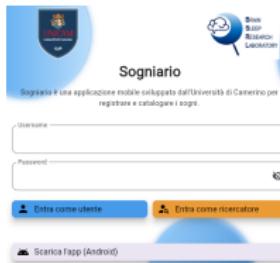
CONCLUSIONI E SVILUPPI FUTURI

- ▶ Prospettiva globale e dinamica, oltre l'analisi a livello singolo



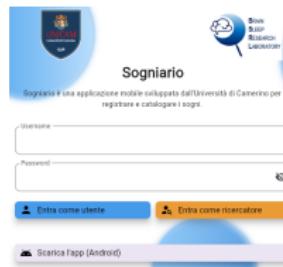
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- ▶ Prospettiva globale e dinamica, oltre l'analisi a livello singolo
- ▶ Applicazione delle tecniche di analisi a dati categorizzati
- ▶ Esplorare l'analisi multi-livello in ulteriori contesti applicativi





Grazie
per l'attenzione!