

Procedure

Dataset



Gaifman graph (several variations)



Clan decomposition method

Example

Let $U = \{a, b, c, d, e\}$ be a diagnostics set.

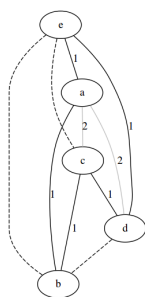
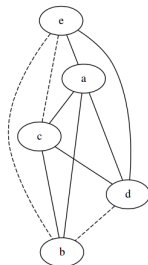
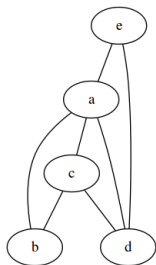
Variants of Gaifman graphs:

Patients:

$p_1: a b c$

$p_2: a d e$

$p_3: a c d$



Gaifman graph

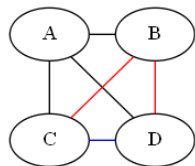
Definition

- Each diagnostic is represented as a **vertex**.
- Each pair of diagnostics that a patient has is represented with an **edge**

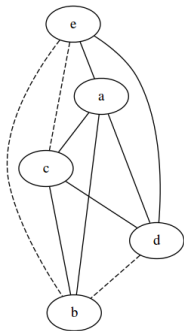
Clan decomposition

Definition

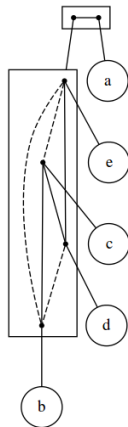
Vertices grouped into clans whose elements are indistinguishable among them by non-members of the clan.



Clan decomposition



Patients:
 $p_1: a b c$
 $p_2: a d e$
 $p_3: a c d$



Dataset: Hospital de la Santa Creu i Sant Pau.

- Hospitalizations for the years 2015-2016.
- 79534 rows.
- Each row contains diagnostics and treatments information corresponding to a patient.

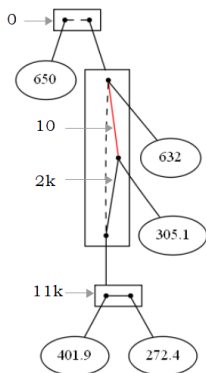
Hospitalization dataset

| | | | | | |
|--------|---------------------------------------|--------|--------------------------------------|--------|--------------------------------------|
| 569.83 | PERFORACIO INTESTINAL | 567.29 | ALTRES PERITONITIS SUPURADES | 038.9 | SEPTICEMIA INESPECIFICADA; SEPTICE |
| 428.0 | INSUFICIENCIA CARDIACA CONGESTIVA IN | 427.31 | FIBRIL.LACIO AURICULAR | 276.1 | HIPOSMOLARITAT I/O HIPONATREMIA; |
| 381.10 | OTITIS MITJANA SEROSA CRONICA, SIMPL | | | | |
| 784.3 | AFASIA | 401.9 | HIPERTENSIO ESSENCIAL INESPECIFICAD | 519.8 | ALTRES MALALTIES D'APARELL RESPIRA |
| 599.0 | INFECCIO VIES URINARIES,LOCALITZACIO | 404.9 | INFECCIO BACTERIANA INESPECIFICADA | 873.42 | FERIDA OBERTA DE FRONT, NO COMPL |
| 584.9 | FALLIDA RENAL AGUDA NO ESPECIFICADA | 564.00 | RESTRENYIMENT, INESPECIFICAT | 724.2 | LUMBAGO; DOLOR LUMBAR; SINDRON |
| 041.6 | INFECCIO PER PROTEUS (MIRABILIS)(MOR | 041.49 | ALTRES INFECCIONS PER ESCHERICHIA C | 041.85 | INFECCIO BACTERIANA PER ALTRES OR |
| 511.9 | EMBASSAMENT PLEURAL INESP.; EMBASS | 414.8 | ALTRES FORMES ESPECIF.DE CARDIOP.IS | 427.31 | FIBRIL.LACIO AURICULAR |
| 569.89 | ALTR.TRAST.INTESTINALS ESPECIF.;ENTER | 285.9 | ANEMIA INESPECIFICADA; ANEMIA: NO; | 403.90 | NEFROPATIA HIPERTENSIVA INESP. S/M |
| 518.84 | FALLIDA RESPIRATÀRIA AGUDA I CRÀNICA | 276.2 | ACIDOSI; ACIDOSI: NOS, LACTICA, META | 401.9 | HIPERTENSIO ESSENCIAL INESPECIFICA |
| 519.8 | ALTRES MALALTIES D'APARELL RESPIRATO | | | | |
| V45.71 | ABSÒNCIA ADQUIRIDA DE MAMA I MUGR. | 305.1 | TRASTORN PER US DE TABAC; DEPENDE | 305.02 | ABUS D'ALCOHOL, SENSE DEPENDENCI |
| 276.0 | HIPEROSMOLARITAT I/O HIPERNATREMIA; | 780.39 | ALTRES CONVULSIONS | 580.89 | GLOMERULONEFRITIS AG.AMB ALTRES |
| 584.9 | FALLIDA RENAL AGUDA NO ESPECIFICADA | 458.9 | HIPOTENSIO INESPECIFICADA; HIPOTEN | 427.31 | FIBRIL.LACIO AURICULAR |
| 276.7 | HIPERPOTASSEMIA; HIPERKALEMIA; POTÀ | 276.8 | HIPOPOTASSEMIA; DEFICIT POTASSI [K]; | | |
| 414.01 | ATEROSCLEROSI D'ARTERIA CORONARIA N | 584.9 | FALLIDA RENAL AGUDA NO ESPECIFICA | 998.59 | ALTRA INFECCIO POSTOPERATORIA |
| 403.90 | NEFROPATIA HIPERTENSIVA INESP. S/MEN | 496 | OBSTRUCCIO CRONICA VIES AERIES,NCC | 585.9 | INSUFICIËNCIA RENAL CRÀNICA NO ES |
| 751.3 | MAL.DE HIRSCHPRUNG I ALTR.TRAST.FUN | 999.82 | EXTRAVASACIÀ D'UN ALTRE AGENT VESI | | |
| 782.3 | EDEMA; ANASARCA; HIDROPESIA; EDEMA | 356.2 | NEUROPATIA SENSORIAL HEREDITARIA | 719.7 | DIFICULTAT DE CAMINAR |
| 997.5 | COMPLICACIONS URINARIES PER CIRURGI | 995.92 | SÒPSIA GREU | 038.9 | SEPTICEMIA INESPECIFICADA; SEPTICE |
| 276.3 | ALCALOSI; ALCALOSI: NOS, METABOLICA, | 414.8 | ALTRES FORMES ESPECIF.DE CARDIOP.IS | 396.2 | INSUFICIENCIA VALVULA MITRAL I ESTI |
| 710.2 | SINDROME SECA;QUERATO-CONJUNTIVITI | 516.32 | PNEUMONITIS INTERSTICIAL IDIOP-TICA | 518.84 | FALLIDA RESPIRATÀRIA AGUDA I CRÀNICA |

Our analyses:

- Diagnostics.
- Diagnostics and treatment.
- Diagnostics, treatment and patient condition.

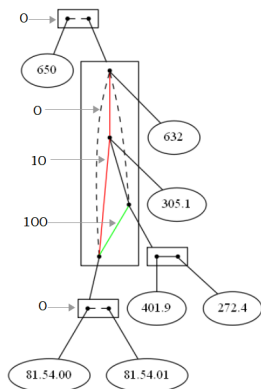
Diagnostics



- 650 Normal delivery.
- 632 Missed abortion.
- 305.1 Tobacco use disorder.
- 401.9 Unspecified essential hypertension.
- 272.4 Other and unspecified hyperlipidemia.

Items appearing at least 100 times.

Diagnostics and procedures



Items appearing at least 100 times.

650 Normal delivery.

632 Missed abortion.

305.1 Tobacco use disorder.

401.9 Unspecified essential hypertension.

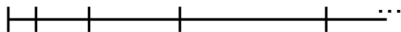
272.4 Other and unspecified hyperlipidemia.

81.54.00 Total knee replacement (left).

81.54.01 Total knee replacement (right).

Variants of Gaifman graphs

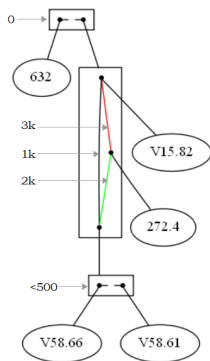
Exponential



Linear



Diagnostics, procedures and conditions



- 632 Missed abortion.
- V15.82 Personal history of tobacco use.
- 272.4 Other and unspecified hyperlipidemia.
- V58.66 Long-term (current) use of anticoagulants.
- V58.61 Long-term (current) use of aspirin.

Linear Gafman graph, items appearing 250 times.

Conclusions

Purpose

To be an exploratory tool from data.

After the analysis...

- To have a general view about co-occurring diagnostics.
- To complement statistical approaches.

Thank you!