Prediction of Risk Factors for Falls in Elderly using Partial Health Information

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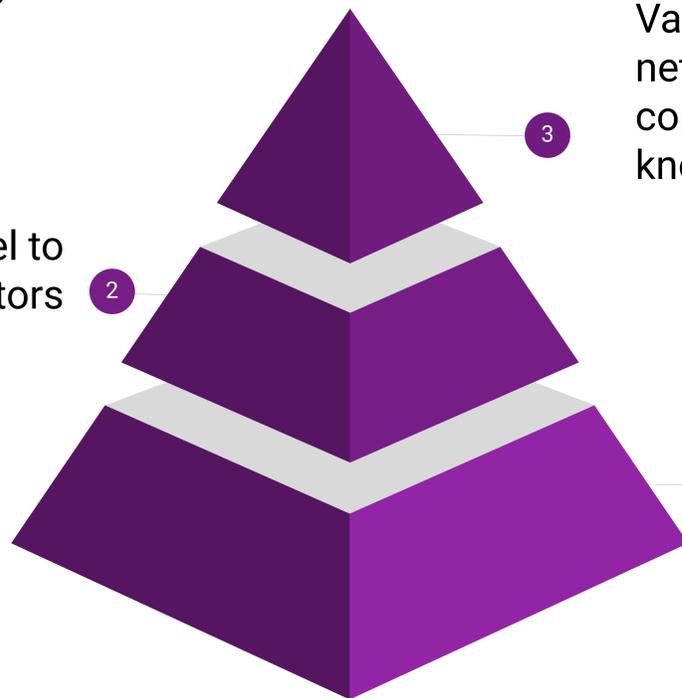
1-Introduction

Falls in the elderly are the number one cause of traumatic death in this population. We propose a Bayesian Network model to predict the risk factors for fall, built on the basis of -

- general statistical information (dataset)
- the knowledge about risk factors (Ontology)
- partial observation about a given person.

Data for this study was provided by Hospital of Lille, France.
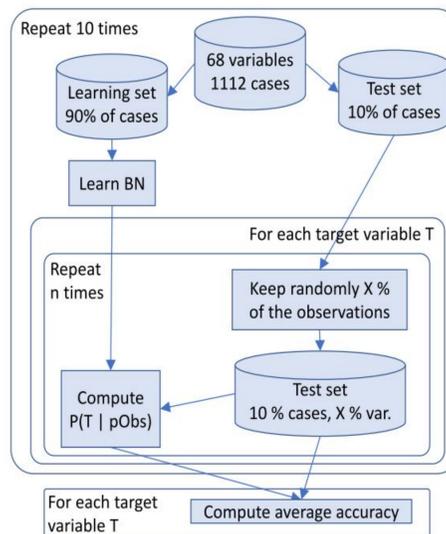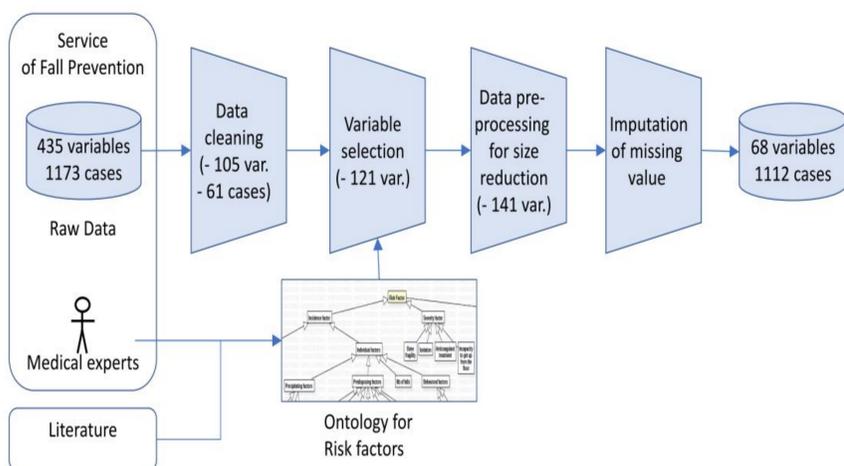
2- Methodology

Validate the Bayesian network model by comparison with well known classifiers

Develop model to predict risk factors

Data preprocessing, Missing value Imputation and Selection of Variables
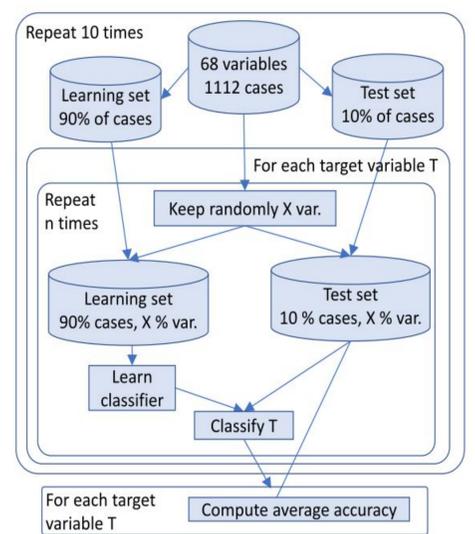
Grand Idea
Evaluate the risk factors to prevent the falls in elderly

3- Illustration

(a) Use a Bayesian network as a classifier

(b) Use an other classifier

5- Conclusion

The accuracy provided by the 5 classifiers are very similar, whether the prediction is based on the complete set of observation or on a subset (randomly selected). Further work is required to improve the use of this real dataset.

4- Accuracy using all/ partial observations

Risk Factors	Baseline Classifier	Complete Observations										70% observations									
		BN		LR		DT		RF		SVM		BN		LR		DT		RF		SVM	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
dep	71.3	71.1	7.6	73.2	6.2	67.4	3.6	73.7	6.1	**73.8**	6.5	71.0	7.8	72.3	6.1	65.1	5.8	**72.5**	6.5	71.9	6.5
alc	79.9	79.1	5.6	79	5.2	66.2	4.4	79.8	5.1	**80**	5.3	79.3	5.2	79.6	4.9	65.1	4.3	79.6	5.2	**80**	5.3
nbChu2	58	56.8	8	**60**	4.6	54.8	4.5	58.2	4	57.5	5.7	57.6	7	**61.3**	4.4	52.8	5.7	61.2	6.4	60.2	3.5
fractur	53.1	61.7	5.6	62.2	5.3	55.1	3.7	**65**	4.8	64.5	4.4	62	6.2	62.4	4.19	57.2	4.3	63.8	4.2	**64.1**	5.8
peurTom	76.4	77.4	4.3	**78.2**	5.2	71.3	4.7	76.8	5	76	4.9	75.5	4.4	76.9	4.9	70.4	6.6	**77.7**	5.6	76.3	4.9
gt1hSol	79.6	79.1	12.5	**80.2**	11.3	68.6	7.9	80	12.5	80	13	76.8	12.1	79.4	11.56	68.5	8.9	79.9	12.9	**80.1**	13
nbMed3	44.4	**60.4**	5.5	57.8	6.5	49.8	3.7	56.9	6.3	57.8	5.1	**57**	4.9	**57**	4.1	48.2	3.9	55.1	4.9	56.3	3.7
gt1psych	55.9	73.6	2.8	**74.3**	3.5	64.3	3.1	73.4	2.3	74	4.1	67	6.4	67.5	6.5	59	5.5	66.2	6.2	**68.4**	4.6
trVision	**59.9**	55.1	12.9	59	9.7	53.6	7.7	57.5	12.5	59.1	13.7	54.6	12.6	58.2	9.3	52	5.3	54.2	12.5	58.1	13.8
trMar	80.9	80.8	6.8	83.1	6.9	75.4	4.5	82.9	8.5	**83.5**	7.9	79.9	8.3	82.1	8.9	75.8	8.3	82.3	9.1	**82.5**	10
trEq	69.9	78.9	5.6	78.4	6.9	68.5	5.9	78.7	7.9	**79.5**	8	71.8	9.5	**73.4**	7.4	64.6	6.5	71.8	9.5	72	9.7
osteoConf	80	78.4	5.4	**80.9**	5.9	73.9	4.6	80.3	6	79.7	5.5	78.5	5.6	**80.6**	5.5	74	3.9	79.9	5.8	79.6	5.4
ADLgt5	67	71.3	5.2	73.9	6.5	66.1	4.6	74.1	5.7	**75.4**	5.8	71.9	4.2	**74.2**	5.1	65	4.7	73	5.2	73.3	5.1
sarcopen	70.3	**72.4**	7.9	70.5	7.8	63.8	5.5	72.2	7.7	70.9	9.4	69.9	9.1	68.7	6.4	60	3.4	70.3	7.4	**70.5**	8.5
newHypoT	53.5	**61.1**	8.8	59.7	6.3	56.2	4.8	60.9	5.2	59.5	7.6	58.9	11.5	58	7.7	55.6	2.9	**59.1**	5.4	58.5	7.5

BN : Bayesian network, LR : logistic regression, DT : decision tree, RF : random forest, SVM : support vector machine

6- References

- G. Sihag, V. Delcroix, E. Grislin, X. Siebert, S. Piechowiak, and F. Puisieux. Prediction of risk factors for fall using bayesian networks with partial health information. In proceedings of the IEEE GLOBECOM 2020 Workshop on AIDSH in Taipei, Taiwan(Accepted), 7-11 Dec 2020.
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