

A Rough Sets Approach for Supporting the Triaging of Hepatitis Patients

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Paper Outline

- Background and Motivation.
- **Rough Sets as Basis for Reasoning Under Uncertainty.**
- Rough Sets applied to forecasting the prospects of hepatitis treatments.
- **Conclusion and Future work.**

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Research challenge and background

Techniques other than classical logic

- Fuzzy Set theory: Zadeh; 1980's
- Rough Set theory: Pawlak; 1982

Applications of Rough set theory

- Economics
- Medical diagnosis
- Biology
- Chemistry
- Psychology

Motivation for choosing the application area

Chronic Viral Hepatitis

More than 500 million people worldwide

Responsible for severe complications:

- Cirrhosis
- Hepato-cellular carcinoma
- Major morbidity and mortality worldwide

Treatment of chronic viral hepatitis has markedly improved

Our system is primarily aimed at providing a triaging support, so that:

Patients can be:

- Processed quicker
- Better geared towards the right treatment or to
- the correct further examination.

Reducing the initial number of tests

Quickly filtering out clear cases

Reducing cost and time

Rough Sets as Basis for Reasoning Under Uncertainty

Rough Sets as basis for reasoning under uncertainty

- **Rough sets has been used for knowledge elicitation**
- **Analyzing the relationships between various factors and how they affect the results of a patient's diagnosis**
- **Constructing the decision rules for classifying unseen objects**
- **Handling inconsistency by discretizing and measuring the fuzziness of each factor.**

Rough Sets Applied to Forecasting the Prospects of Hepatitis Treatments

Rough Sets applied to forecasting the prospects of hepatitis treatments

<i>Patient</i>	H_A	H_B	H_C	<i>TBE</i>	<i>TBL</i>	<i>CT</i>	<i>RT</i>	<i>PROSPECT GOOD</i>	<i>PROSPECT BAD</i>
p_1	$\langle .1, .3 \rangle$	$\langle .2, .4 \rangle$	$\langle .4, .7 \rangle$	$\langle .4, .7 \rangle$	$\langle .5, .6 \rangle$	$\langle .5, .3 \rangle$	$\langle .1, .2 \rangle$	$\langle .2, .4 \rangle$	$\langle .4, .7 \rangle$
p_2	$\langle .2, .3 \rangle$	$\langle .1, .2 \rangle$	$\langle .5, .7 \rangle$	$\langle .4, .6 \rangle$	$\langle .2, .5 \rangle$	$\langle .6, .9 \rangle$	$\langle .4, .5 \rangle$	$\langle .4, .6 \rangle$	$\langle .4, .7 \rangle$
p_3	$\langle .4, .5 \rangle$	$\langle .3, .6 \rangle$	$\langle .4, .5 \rangle$	$\langle .7, .9 \rangle$	$\langle .1, .2 \rangle$	$\langle .7, .3 \rangle$	$\langle .2, .3 \rangle$	$\langle .6, .8 \rangle$	$\langle .2, .4 \rangle$
p_4	$\langle .4, .6 \rangle$	$\langle .2, .3 \rangle$	$\langle .1, .5 \rangle$	$\langle .1, .2 \rangle$	$\langle .2, .6 \rangle$	$\langle .5, .7 \rangle$	$\langle .5, .7 \rangle$	$\langle .2, .6 \rangle$	$\langle .3, .5 \rangle$
p_5	$\langle .3, .7 \rangle$	$\langle .2, .5 \rangle$	$\langle .3, .7 \rangle$	$\langle .4, .7 \rangle$	$\langle .3, .4 \rangle$	$\langle .7, .9 \rangle$	$\langle .1, .2 \rangle$	$\langle .5, .6 \rangle$	$\langle .3, .5 \rangle$

Rough Sets applied to forecasting the prospects of hepatitis treatments

PROSPECT GOOD =

$$\langle .2, .4 \rangle / p_1 + \langle .4, .6 \rangle / p_2 + \langle .6, .8 \rangle / p_3 + \langle .2, .6 \rangle / p_4 + \langle .5, .6 \rangle / p_5$$

PROSPECT BAD =

$$\langle .4, .7 \rangle / p_1 + \langle .4, .7 \rangle / p_2 + \langle .2, .4 \rangle / p_3 + \langle .3, .5 \rangle / p_4 + \langle .3, .5 \rangle / p_5$$

Early Conclusions and Planned Future Work

- The idea behind our model and the prototype implementation was to provide:
 - A method that allows for the quick sorting of patients.
 - A tool for estimating the success of a treatment under a given diagnosis.

- As our example has shown, a **simple collection** of precedents will allow a medical expert to come up with an **easy to handle set of sample cases**.
- Classifying a patient as belonging to one of these sets gives us an estimate of **the most likely outcome of a chosen treatment**.

- The **bigger** the collection of cases, which does actually grow with every newly entered case, the **more precise** the recommendation of the **system** will of course be.

Center of To Do List

- Build a core collection of representative cases at Mansoura Univeristy Hospital.
- Work on improving the user inerface.
- ...
- ...
- Ultimately to evaluate the results of the planned practical tests to be carried out together with Mansoura University Hospital.

***Thank You For Listening To Our
Presentation in Spite of the Late
Hour***

***... and Keep Your Fingers Crossed
for the Planned Tests at Mansoura
University Hospital***