

March 12, 2002

Dear Author,

We are happy to inform you that your paper has been accepted for presentation at AAAI-02.

Your paper was one of 121 accepted to AAAI-02, out of 469 submissions. AAAI is a highly selective conference, and you are to be congratulated on your paper's acceptance.

Please pay careful attention to the reviewers' comments as you revise your paper to make it even better. Formatting instructions for the final version of your paper will be forwarded to you in a separate message. Please begin revising and reformatting your paper immediately, since both processes can be time-consuming. You will be allotted six pages in the Proceedings, and allowed to purchase up to two additional pages if you wish. Please deliver the camera-ready version of your paper to the AAAI office no later than April 9, 2002.

As you may know, AAAI is experimenting with a rather different format for the technical program in 2002. A centerpiece of this year's program will be informal poster sessions, which will allow researchers to interact directly with authors. Every paper accepted to AAAI-02 will be provided with a slot in one of the two poster sessions, which will be the sole technical events in the program during their scheduled times, in order to maximize attendance and interaction. Refreshments will also be served during the poster sessions.

A small number of selected papers will also be provided oral presentation slots in the plenary program. Oral papers were chosen using a number of criteria, including quality, breadth and accessibility of topic, and the degree to which they address issues of significant current interest or debate in the AI community. We are happy to report that your paper was accepted for an oral presentation slot. Details about the scheduling of your paper will be sent in a few weeks. Please note that all papers will be treated equally in the proceedings, and that every paper accepted for AAAI is regarded to be of extremely high quality.

Thank you for submitting your paper to the conference. We look forward to seeing you in Edmonton!

Sincerely,

Rina Dechter, Michael Kearns and Rich Sutton
AAAI-02 Program Cochairs

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AAAI-02 REVIEW FORM

Please type your remarks normally, in plain ASCII text, without any special formatting codes - remember many people don't use LaTeX.

AAAI-02 PAPER REVIEW FORM -- COMMENTS FOR THE AUTHOR(S)

PAPER CODE:

270

PAPER TITLE:

A Graphical Criterion for the Identification of Causal Effects in Linear Models

SUMMARY:

What is the main result of the paper? (2 sentence limit)

This paper presents a sufficient qualitative test (requiring only structural information) for deciding if the parameters a linear causal model are identifiable.

Is this result new? Why or why not?

As far as I know it is new.

TECHNICAL EXCELLENCE:

- Is the paper technically strong?

The results presented are impressive because of their generality and complexity.

- Is the result significant?

Fairly significant. The qualitative test is quite complicated for a human to apply, therefore it will probably be necessary to resort to a computer-implemented application of it. However, judging identifiability for linear systems using a computer can already be done easily enough using the quantitative information and linear programming techniques.

Nonetheless, the implementation that they describe in this paper shows that this criterion can be used to more easily find a set of auxiliary variables (as opposed to just deciding if a given set is sufficient).

- Is the paper technically sound?

Yes.

- Does the paper reference appropriate past work?

As far as I know, yes.

RELEVANCE, IMPORTANCE, and ORIGINALITY

Is the paper a significant contribution to the field of AI?

To be honest, this paper is probably more relevant to social sciences or statistics where these linear structural models are in prevalent use; however, graphical models in general are relevant to the field of AI, and I could see how this work would be of interest to some researchers in AI.

Also applies AI methods of graphical models to this domain.

Does the paper belong to one of the following categories:

- New synthesis that brings subfields of AI together,

- Scaling studies (theory to support scaling, experimental study of scaling, bringing AI out of the laboratory),

- AI contributions to other disciplines,

Yes.

- Physical realizations of AI systems

CLARITY

Is the paper clearly written? Does it motivate the research?

Very well written.

OTHER COMMENTS FOR THE AUTHOR(S):

The last sentence of the first paragraph of "The AV Criterion" section states that "No condition is imposed on the existence of alternative paths between Z and Y...". This statement is not true as Theorem 2 requires that Z not be a parent of Y.

In the conclusion they state definitively that the method is not complete but in the body of the paper they speculate that the method is complete.

The author should clarify this discrepancy.

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AAAI-02 PAPER REVIEW FORM -- COMMENTS FOR THE AUTHOR(S)

PAPER CODE: A270

PAPER TITLE:

A Graphical Criterion for the Identification...

SUMMARY:

What is the main result of the paper? (2 sentence limit)

The paper deals with the problem of identification (identifiability) of parameters in a linear DAG (parent = linear combination of children + noise.)

It proposes a sufficient criterion for a DAG to be identif. in the case of correlated noise by introducing the notion of auxiliary variables.

The paper develops condition for the identification of causal effect from the co-variance matrix.

Is this result new? Why or why not?

Might be new. I am not sufficiently familiar with the literature on this topic.

TECHNICAL EXCELLENCE:

- Is the paper technically strong?

- Is the result significant?

- Is the paper technically sound?

not sure.

- Does the paper reference appropriate past work?

While the authors propose a rather unique (to me) view of this problem (the algorithmic solution utilizes a graph), the problem reminds me of similar id problems in the linear system theory. In fact, the problem as stated in Eq.1 (albeit with an error, the right hand side of Eq.1 should contain a transpose term) would be to factorize the Sigma as specified. If

this factorization is unique, the system is identifiable. As the authors note, this is easily the case when Psi is diagonal (Thm 1). In general, it seems that some rank-based analysis could give an equivalent, maybe easier answer to the id problem.

I could also be confused..

RELEVANCE, IMPORTANCE, and ORIGINALITY

Does the paper belong to one of the following categories:

- New synthesis that brings subfields of AI together,
- Scaling studies (theory to support scaling, experimental study of scaling, bringing AI out of the laboratory),
- X - AI contributions to other disciplines,
- Physical realizations of AI systems

CLARITY

Is the paper clearly written? Does it motivate the research?

Maybe the only other concern I have is that there are no (not even simple) experimental examples that could make this paper easier to read for someone not

absolutely familiar with this topic. Also, excessive use of new notation makes the paper very hard to follow.

OTHER COMMENTS FOR THE AUTHOR(S):

AAAI-02 PAPER REVIEW FORM -- COMMENTS FOR THE AUTHOR(S)

PAPER CODE: 270

PAPER TITLE: A Graphical Criterion for the Identification of Causal Effects in Linear Models

SUMMARY:

What is the main result of the paper? (2 sentence limit)

The paper presents a criterion on when a system of linear equations (structural model) that may include latent variables has a unique solution for its parameters. Such a criterion is based only on the graph structure of the system.

Is this result new? Why or why not?

I am not familiar with the literature of structural equations.

According to the paper, it is, claiming that it is relaxing constraints of previous work (the "bow-free" constraint).

TECHNICAL EXCELLENCE:

- Is the paper technically strong?

It seems so, although the proofs are omitted.

- Is the result significant?

If correct, it is. Estimating the parameters of continuous domains with hidden variables is a difficult and important problem.

- Is the paper technically sound?

As a non-expert, I have some questions about that. The claim is that every X_i that is connected to Y by both a \rightarrow and a \leftrightarrow path should have an AV in order to have identifiability. But the definition of an AV includes clause (i) which requires that there should be bidirected paths $X_i \leftrightarrow X_{i+1}$ for every X_i in the chain. Doesn't that mean that the chain might be blocked (making Z and Y d-separated along that path)? For example, the authors claim that variable Z in network (f) in figure 4 satisfies the AV criterion and thus produces a linearly independent equation for Y . However, it seems to me that every path from Z to Y that go through X_1 (the variable with the "bow pattern") is blocked. In this example, the chain is blocked at W_2 since the path there is $\dots \rightarrow W_2 \leftarrow \dots$.

My doubts come from the absence of any formal proofs, and the apparent contradictions to my intuition such as the one I describe in the previous paragraph.

- Does the paper reference appropriate past work?

Yes.

RELEVANCE, IMPORTANCE, and ORIGINALITY

Is the paper a significant contribution to the field of AI?

It is theoretically significant.

Does the paper belong to one of the following categories:

- New synthesis that brings subfields of AI together,

No.

- Scaling studies (theory to support scaling, experimental study of scaling, bringing AI out of the laboratory),

No.

- AI contributions to other disciplines,

It is contributing to statistics and in particular structural equation modeling.

- Physical realizations of AI systems

No.

CLARITY

Is the paper clearly written? Does it motivate the research?

It is fairly dense. However the authors present is clearly enough and include many examples. It would be beneficial to include some attempt at building an intuition behind their solution.

OTHER COMMENTS FOR THE AUTHOR(S):

Some minor typos and optional clarity points:

- page 2, column 1, "fixed the structure of the model" \rightarrow "after fixing the structure of the model".

- page 3, column 1, paragraph 1, "if there are a directed" \rightarrow "if there is a directed".

- page 3, column 2, "the well-know problem" \rightarrow "the well-known problem".