INFO 4990/5993 Literature Review & Research Proposal

The Learning Hub
Academic Language & Learning
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Outcomes

You will be able to:

- Identify the purpose & structure of a literature review
- Identify the purpose & structure of a research proposal
- Understand the language elements involved

The Foundations of a Literature Review and Research Proposal

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Literature review: What is it?

What we know

Context
Achievements
Limitations
Understanding

What we don't know

Justify your research
Establish originality
i.e. The research gap

The research

Refine RQs
Define the scope

Literature review: Questions to ask

summary + evaluating

What we know

What research has been done before?

How is this research relevant to my study?

How is this research different from my study?

Where does the research agree or disagree?

What are the strengths and weaknesses of the existing research?

What we don't know

Justify your research

Establish originality

i.e. The research gap

debating topic

Literature review: Place in the process

The review	The product
Preliminary review	Research proposal
Large-scale review	Thesis chapter
Large-scale or systematic review	Stand-alone publication (or part of TwP*)
Selective or limited review	Introductions/discussion sections for publications (or part of TwP*)

* Thesis with/by publication

What we know: ‘The Literature’

Peer-reviewed **journal articles**

Published **conference proceedings**

Chapters in edited **academic books**

+

‘**Grey literature**’, such as technical reports, statistics, patents, unpublished conference papers, posters, infographics.

Anything else?

What we know: Search strategies

Step 1: Break down the topic

Step 2: Identify key concepts

Step 3: Write down any keywords and synonyms or related concepts

Step 4: Identify where to search (i.e. databases) and begin the search

Databases: https://www.library.sydney.edu.au/browse/engineering

AI resources: Connected Papers, Research Rabbit, Perplexity etc.

What we know: Search strategies

STEM Librarian: stem@usyd.libanswers.com

https://www.library.sydney.edu.au/about/contact/librarians

Make an appointment

Appointments are available for Honours, Higher Degree by Research students and staff.
If you would like to discuss planning for or measuring research impact, please email research.services@usyd.libanswers.com and our team will contact you.

In person | Online

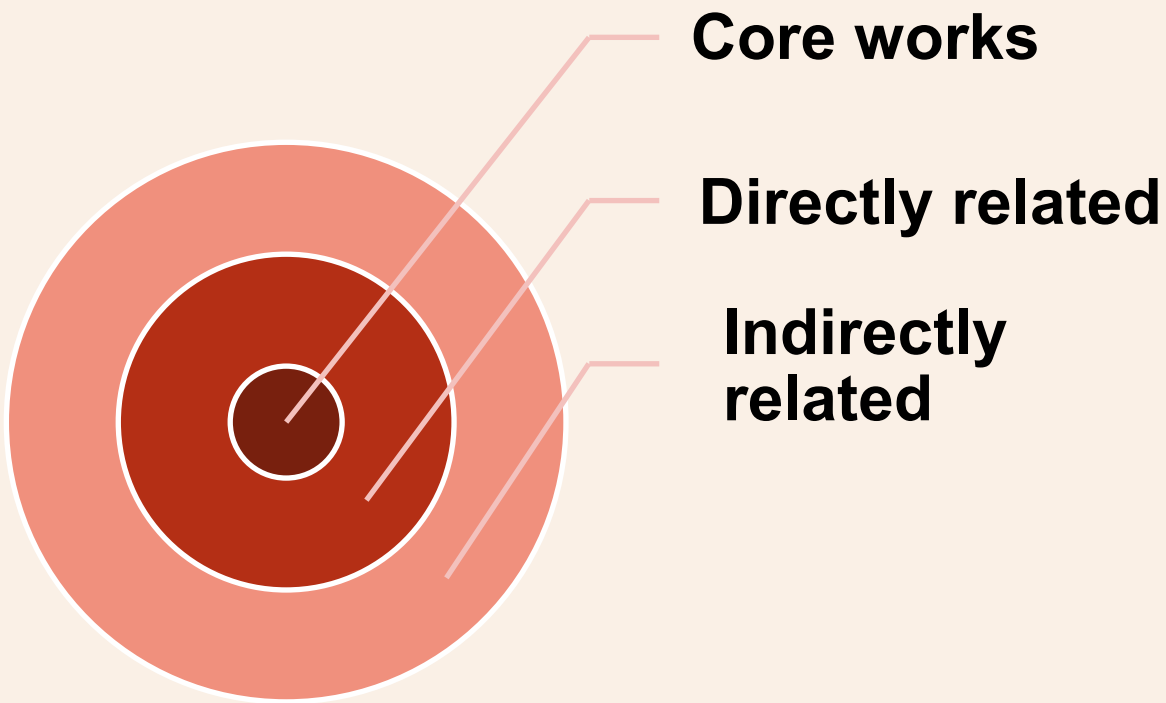
What we know: Break down the topic

Topic area: Visual analytics for bettering the evaluation and care of health		**Related literature**
How?	**How** does visual analytics *help* in health care? **How** do humans *interpret* visualisations?	Existing literature on visualisation tools for electronic health records and how these are interpreted
What areas/ topics?	Medical informatics 'Sense making' What **studies exist**? What are the **issues/problems** in using visual analytics in health care?	e.g. West et al. systematic review 1996-2013 Large amount of complex electronic medical data Lack of user participation

What we know: Break down the topic

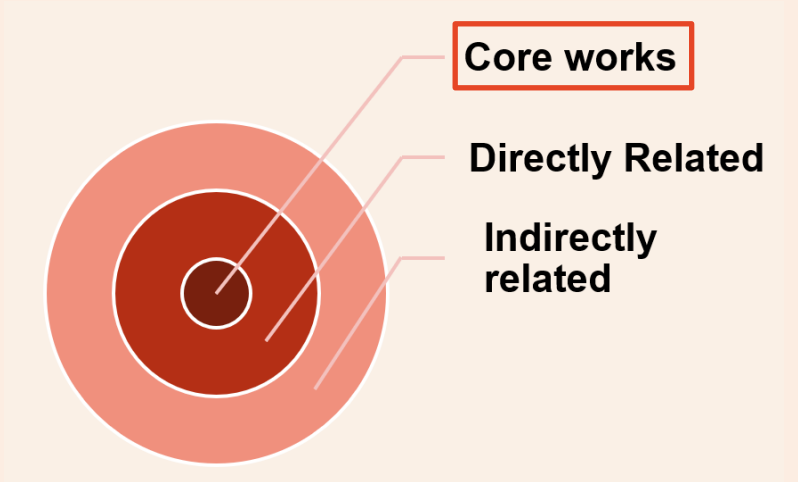
Topic area: Visual analytics for bettering the evaluation and care of health		Related literature
What approach?	What approaches to visualisation are used in health care and other areas?	Graphs, time series; mapping data with visuals; …
Where?	Australian studies?	Are there any?
Why?	Develop health data visualisation tools to support interpretation and decision making.	

What we know: Break down the topic



What we know: Core works

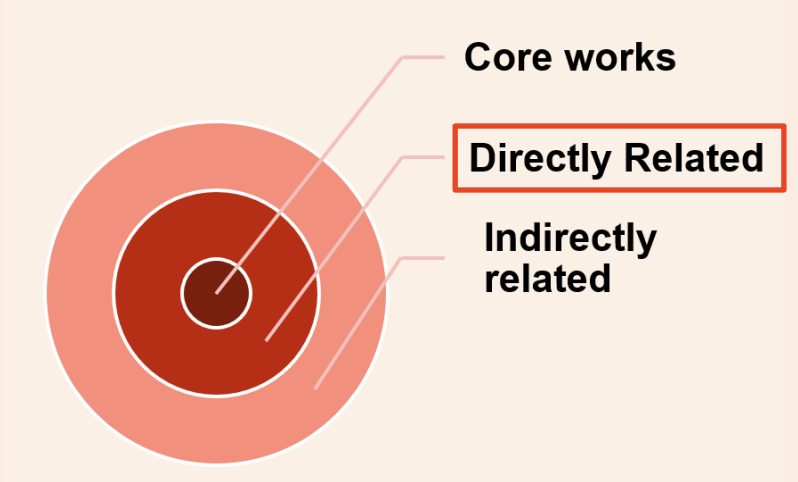
- A good way to gain clarity
- Start with one issue or area
- Begin with one author and approach the problem as a ‘reaction’ to their work
- Move onto a very small number of specific topic areas, issues or authors



What we know: Directly related

Works or authors related directly as they:

- Focus on the same questions
- Address part of the same issue
- Use some of the same methods
- Had the same data



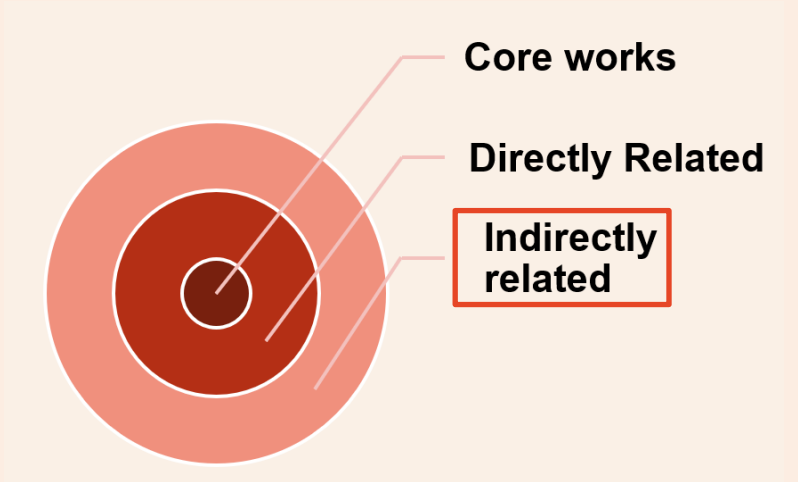
Typically a larger list than the core works

What we know: Indirectly related

Some works or authors will only have:

- ‘passing relevance’
- a ‘single point of contact’

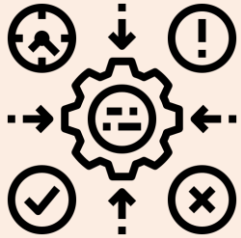
Can be useful later in your research



What we know: Gather information

Synthesis grids are useful tools for organising information and identifying relations by allowing you to:

Pinpoint core topics, methods and results



Identify similarities and differences

Make connections

What we know: Gather information

Source	Problem	Method	Results	Overall focus
(Source, date, page no.)	Comparison of 2 skin tone detection methods in 5 colour spaces (both non-parametric): Look-up table and Bayesian. Which performs better?	What similarities or differences can you identify?	Bayesian method resulted in ML and MAP depending on assumptions made. ML outperformed MAP technique and the lookup table method	Skin colour modelling techniques (non parametric)
(Source, date, page no.)	What is the best colour space selection for best skin tone selection?	Designed an optimum detector using the Neyman-Pearson test on conditional probabilities derived from normalises histogram of a database of images	Colour space does not influence performance as long as the optimum skin detector for that space is used	Colour space
(Source, date, page no.)	Survey of pixel-based skin colour detection techniques and evaluation of results. Which performs better?	Identified 3 elementary problems: choice of colour space, modelling of skin colour distribution, developing efficient processing algorithm. Survey first two.	Categorised skin colour modelling techniques Bayesian Skin Probability Map method best followed by maximum entropy model	Skin colour and colour space

What we know: Connect information

Source	Problem	Method	Results	Overall focus
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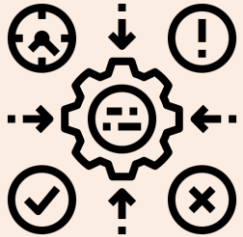
What we know: Connecting everything

Focuses on a question, issue or problem



Organises literature around the question, issue or problem

Evaluates literature in relation to the question, issue or problem

Literature Review

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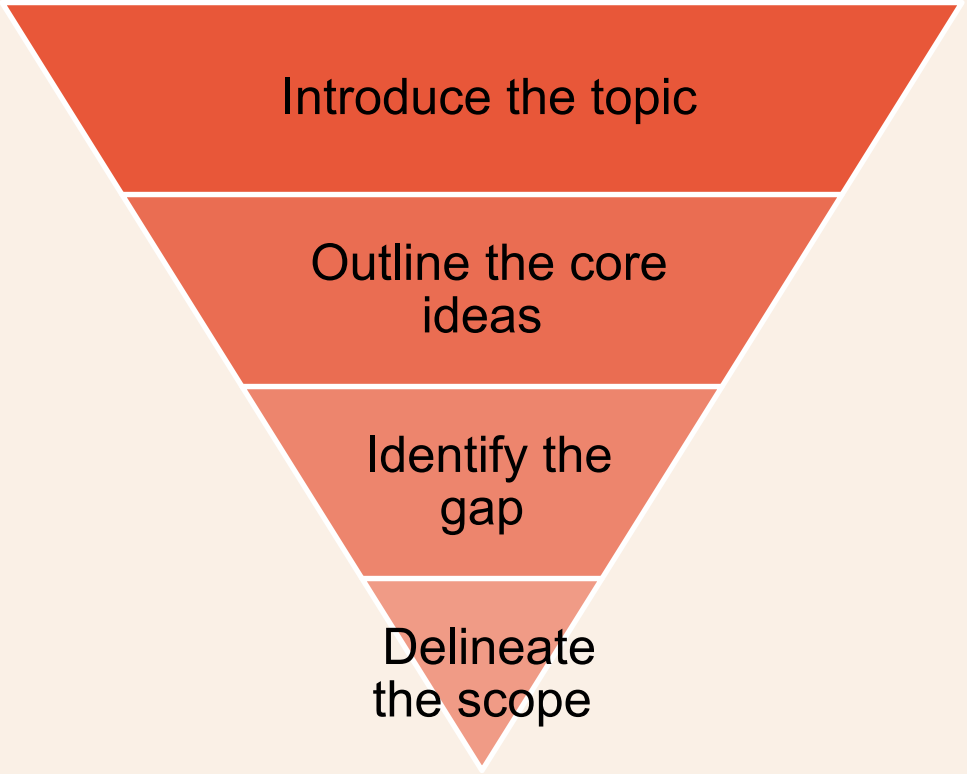
Rhetorical moves: introducing lit review



Introductions: Rhetorical moves

The field of data science and informatics in healthcare and medicine is a rapidly growing area especially with increasing availability and adoption of electronic health records (EHRs) [1]

Introduce topic

… this presents an opportunity to analyse this information in the form of interactive web-based visualisations. … Graphical representations … more effectively communicate information to human readers,… how humans interpret abstracted data and make decisions is known as 'sense-making'.

Outline core ideas

Introductions: Rhetorical moves

… there is a lack of work in representing this information graphically, especialy in Australia.

Identify gao

… The gap exists where the two fields, medical infomatics and sense-making, overlap. This review aims to achieve X by means of Y.

Deliniate scope

Types of academic writing

Type	Purpose	Characteristics
Descriptive	Describe, recount	Concrete terms, reference to articles, descriptions of objects, techniques, models etc.
Analytical	Re/organise, relate	Abstract terms, relational language, clear structure of ideas
Persuasive	Argue	Reference to claims
Critical	Challange	Evaluate problems, claims, the work of others

Type of academic writing

Questionnaires and face-to-face interviews are methods of data collection in the social sciences. Questionnaires can be used to sample a large number of people over a wide geographical area. They can normally be conducted by one person at low costs. However, ...

Face to face interviews, by contrast, are relatively small scale. They are labour intensive and time-consuming and costly. But interviews allow . . .

Descriptive

Type of academic writing

Questionnaires and face-to-face interviews are methods of data collection in the social sciences. There are a number of advantages in using questionnaires, including lower costs and sample size. However, the quality of information obtained by interviews is superior to that obtained by questionnaires because the researcher has the opportunity to ask additional questions and explain what questions mean if this becomes necessary. Therefore, the importance of quality in the research process can necessitate the use of interviews for data collection.

Persuasive

Type of academic writing

Questionnaires and face-to-face interviews are methods of data collection in the social sciences. Whereas the sample size in face-to-face interviews is normally small, the questionnaire can be sent out to large numbers of people over a wide geographical area. Costs, both in labour and money, are high with face-to-face interviews, while questionnaires can be distributed quickly by just one person at a relatively low cost. However, in terms of quality of information, interviews are often superior to questionnaires as the researcher has the opportunity to ask additional questions and explain what questions mean if . . .

Analytical

Type of academic writing

Two of the main choices available for social science data collection have long been assumed to be questionnaires sent by mail and the face-to-face interview. While both of these methods do have advantages, both have limitations which bring into question their ultimate usefulness as research tools (Smith & Jones 2009). Although the quality of information obtained by interviews is undoubtedly far superior to that obtained by questionnaires, the cost and time taken to obtain sufficient information on individual interviews is, in the current research climate, no longer tenable. In recent years . . .

Critical

Integrating the types: An example

Gunter & Terry's work [3] was focussed heavily on the costs and risks surrounding litigation and privacy of patients and did not analyse the level of participation from users on both ends. In particular, though the implementation of EHRs will eventually become compulsory in many states internationally, the quality and accuracy of data input was not analysed, especially in the context of older practitioners who may not be computer literate.

Integrating the types: An example

The article lacked in quantitative analysis on the efficacy of EHR systems, where metrics such as latency and accuracy of users may be indicative of the gaps in the system implementation that could be addressed in the future.

The lack of investigation into user participation is addressed by Tsai & Starren [4], which focusses on the role of patients' interaction within the digital system.

Integrating the types: An example

The use of EHRs allows for better analysis of all health histories, especially when in the form of time series. An issue that arises is how this data is analysed and interpreted, given that the patient should have access rights to their own information. ...

Weight

Positive evaluation

Negative evaluation

Research Proposals

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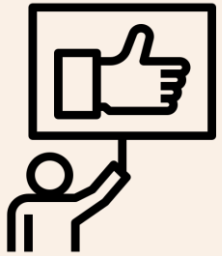
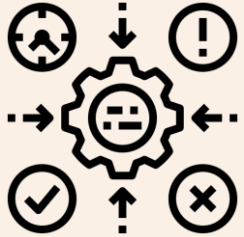
Research proposal: What is it?

Establishes a context for the research



Demonstrates the need for it



Shows how you will meet this need (i.e., the methods you will use)

Research proposal: Why?

- Lays the groundwork for the research you're planning to do.
- Forces you to think through the whole project from beginning to end
- Allows you to better anticipate problems that may occur during the course of your study and to be prepared for them.

Caution: Your audience will be an intelligent, well-informed person, but someone who isn't deeply involved in the problems you are addressing.

Research proposal: Why?

In the most general sense, a thesis proposal is ‘a document that **presents a case** for an idea and the action one proposes with respect to it’ (Krathwohl, 1988, p. 12, emphasis added).

Its purpose is ‘to **justify** what you plan to do in order to gain approval for it’ (Tornquist, 1986, p. 3, emphasis added).

QUESTION: What are the implications of **“presents a case”** and **“justify”** for the way in which you write your proposal?

It must present an argument
It is a type of persuasive essay

Research proposal: An example

Visual Analytics for Bettering the Evaluation and Care of Health

Outline of Research Proposal

Introduction & Motivation

With the immense expansion of digital medical data, there is also much growth in the area surrounding visual analytics, human computer interaction and medical informatics. While many methods of data representation and processing for decision making have been researched and experimented . . .

Research proposal: An example

with, the gap exists where the two fields of medical informatics and sense-making overlap. Visual analytics provide an opportunity to improve the state of healthcare through the bettering of knowledge communication, and so there is a need for analysing different visualisation techniques to determine the best methods to most efficiently represent data that provide insights to strengths and weaknesses in a national medical system. Only then can policy-makers and practitioners concretely label and commit to improving treatment in healthcare.

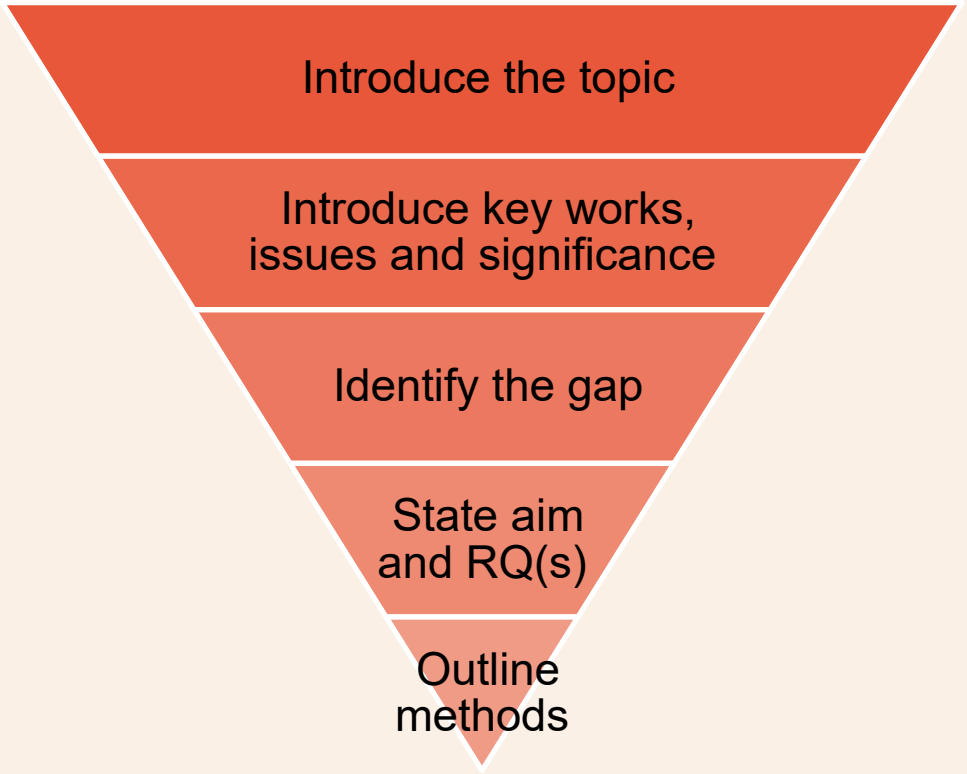
Research proposal: Macro-structure

Section	Content
Introduction	• Problem & significance • How your research would contribute to the solution
RQ(s)/ Hypothesis	• Define terms • State sub-questions/hypotheses
Literature review	• An integrated statement that elaborates on what is known, unknown and why it is important

Research proposal: Macro-structure

Section	Content
Methodology	• Theoretical or conceptual framework(s) • Research design (inc. analytical techniques) • Timeline for completion
Table of contents	• Indicates scope • Provides a temporary organisational framework
References	• Demonstrates engagement with literature

Rhetorical moves



Research proposal: Rhetorical moves

With the immense expansion of digital medical data, there is also much growth in the area surrounding visual analytics, human computer interaction and medical informatics. While many methods of data representation and processing for decision making have been researched and experimented with, the gap exists where the two fields of medical informatics and sense-making overlap.

Research proposal: Rhetorical moves

Visual analytics provide an opportunity to improve the state of healthcare through the bettering of knowledge communication, and so there is a need for analysing different visualisation techniques to determine the best methods to most efficiently represent data that provide insights to strengths and weaknesses in a national medical system. Only then can policy-makers and practitioners concretely label and commit to improving treatment in healthcare.

Research proposal: Rhetorical moves

Section	Content
Topic and significance	With the immense expansion of digital medical data, there is also much growth in the area surrounding visual analytics, human computer interaction and medical informatics.
Key works and issues	While many methods of data representation and processing for decision making have been researched and experimented with . . .

Research proposal: Rhetorical moves

Section	Content
Gap	the gap exists where the two fields of medical informatics and sense-making overlap.
Aim and RQ Methods	Visual analytics provide an opportunity to improve the state of healthcare . . . a need for analysing different visualisation techniques to determine the best methods to most efficiently represent data that provide insights to ...

Language

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常见 intro 用法

Introduce the topic / Claim significance

- The need to computationally identify certain classes of entities referred to in texts has become a core component of many Natural Language Processing tasks.

- There is a great need for fast, reliable Question Answering (QA) systems to allow users to make full use of the vast amounts of textual data available to them on the internet

Introduce the topic / Claim significance

- X is an important component in the Y, and plays a key role in Z
- A common observation of X in daily life is Y
- X is one of the most widely used groups of algorithms for Y

Key works

- A more thorough analysis of possible future directions of QA research can be found in the roadmap paper by Burger et al. (2001).

- The task gained specification in the final two DARPA-funded Message Understanding Conferences (MUC-6, MUC-7; see Chinchor (1998).

Key works

- Field observations (multiple citations) have provided evidence for the significance of X.

- Early investigations of P in Q have been framed in R with S (multiple citations).

- A recent development in X have heightened the need for Y (single citation).

如何 cite

Referring to sources

先说内容，再说 cite

Information Prominent: Research topic / concept is the subject

The costs and risks surrounding litigation and privacy of patients … [2]

Preferred

Author Prominent: Author is subject

Gunter & Terry's work was focussed heavily on the costs and risks surrounding litigation and privacy of patients …..

Key works: Reporting verbs

Neutral reporting verbs

- present, list, report, state, describe, summarise, discuss

Examples

Gunter & Terry [2] have presented a discussion and critical analysis ….

Gunter & Terry further discuss …..

Key works: Reporting verbs

Interpretive or evaluative reporting verbs

- show, note, propose, determine, assert, posit, challenge, doubt, question, argue, recommend, illustrate

Examples

The lack of investigation into user participation is addressed by Tsai & Starren [4], which focusses on the role of patients' interaction

Gap statements

What is your gap? Draft a gap statement.

- Most studies in X have only been carried out in a limited number of areas.
- Several studies have produced estimates of X (Smith, 2002; Jones, 2003), but unfortunately there are still insufficient data to Y.
- However this analysis does not take account X, nor has Y been examined in sufficient detail.

Research aim

- More specifically this thesis aims to advance understanding in the following areas 1… 2… 3… 4…

- This research will focus on the relationship between X and Y

- The objectives of this research are to determine whether…

Research aim

- The purpose of this research is to develop further understanding of X

- We therefore see the automatic generation of a high-accuracy corpus of training data for NER as a feasible and necessary task, given the right resource: Wikipedia.

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