

# CS3243 Project 1 - k-puzzle

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<https://github.com/ybchen97/3243project1>

**Abstract.** This paper outlines our findings and comparisons of various uninformed and informed search algorithms for solving the k-puzzle. In particular, we will be comparing various heuristics for A\* search against each other and the uninformed search algorithm.

**Keywords:** k-puzzle · informed searches · A-start search.

## 1 Problem Specification

### 1.1 State Representation

### 1.2 Actions

### 1.3 Transition Model

### 1.4 Goal State

## 2 Technical Analysis of Search Algorithms and Heuristics

### 2.1 Breadth First Search (BFS)

### 2.2 A\* Search - Manhattan Distance

### 2.3 A\* Search - Linear Conflict

### 2.4 A\* Search - Pattern Database

## 3 Experimental Set Up for Performance Evaluation

### 3.1 Evaluation Criteria

### 3.2 Measurement of Performance Metrics

## 4 Results and Discussion

### 4.1 A Subsection Sample

Please note that the first paragraph of a section or subsection is not indented. The first paragraph that follows a table, figure, equation etc. does not need an indent, either.

Subsequent paragraphs, however, are indented.

**Sample Heading (Third Level)** Only two levels of headings should be numbered. Lower level headings remain unnumbered; they are formatted as run-in headings.

*Sample Heading (Fourth Level)* The contribution should contain no more than four levels of headings. Table 1 gives a summary of all heading levels.

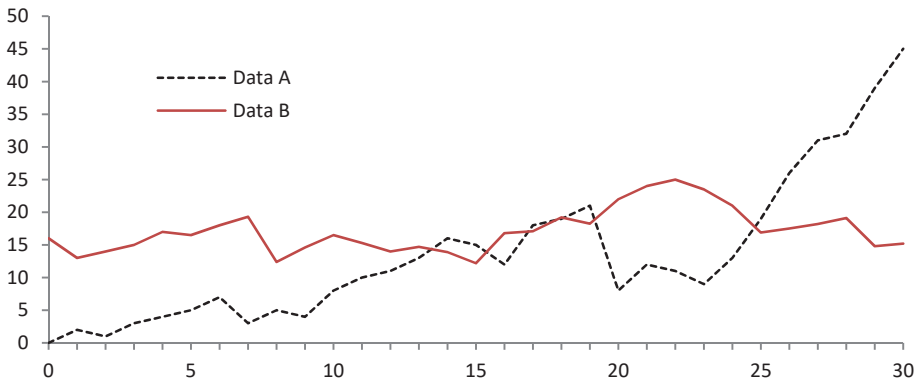
**Table 1.** Table captions should be placed above the tables.

| Heading level     | Example                                     | Font size and style |
|-------------------|---------------------------------------------|---------------------|
| Title (centered)  | <b>Lecture Notes</b>                        | 14 point, bold      |
| 1st-level heading | <b>1 Introduction</b>                       | 12 point, bold      |
| 2nd-level heading | <b>2.1 Printing Area</b>                    | 10 point, bold      |
| 3rd-level heading | <b>Run-in Heading in Bold.</b> Text follows | 10 point, bold      |
| 4th-level heading | <i>Lowest Level Heading.</i> Text follows   | 10 point, italic    |

Displayed equations are centered and set on a separate line.

$$x + y = z \tag{1}$$

Please try to avoid rasterized images for line-art diagrams and schemas. Whenever possible, use vector graphics instead (see Fig. 1).



**Fig. 1.** A figure caption is always placed below the illustration. Please note that short captions are centered, while long ones are justified by the macro package automatically.

**Theorem 1.** *This is a sample theorem. The run-in heading is set in bold, while the following text appears in italics. Definitions, lemmas, propositions, and corollaries are styled the same way.*

*Proof.* Proofs, examples, and remarks have the initial word in italics, while the following text appears in normal font.

For citations of references, we prefer the use of square brackets and consecutive numbers. Citations using labels or the author/year convention are also acceptable. The following bibliography provides a sample reference list with entries for journal articles [1], an LNCS chapter [2], a book [3], proceedings without editors [4], and a homepage [5]. Multiple citations are grouped [1–3], [1, 3–5].

## References

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