

Predictive Model for Concrete Compressive Strength

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Abstract

This is the abstract.

This manuscript is a template (aka “rootstock”) for [Manubot](#), a tool for writing scholarly manuscripts. Use this template as a starting point for your manuscript.

The rest of this document is a full list of formatting elements/features supported by Manubot. Compare the input (`.md` files in the `/content` directory) to the output you see below.

Basic formatting

Bold text

Semi-bold text

Centered text

Right-aligned text

Italic text

Combined *italics and bold*

~~Strikethrough~~

1. Ordered list item
2. Ordered list item
 - a. Sub-item
 - b. Sub-item
 - i. Sub-sub-item
3. Ordered list item
 - a. Sub-item

- List item
- List item
- List item

subscript: H₂O is a liquid

superscript: 2¹⁰ is 1024.

[unicode superscripts](#)⁰¹²³⁴⁵⁶⁷⁸⁹

[unicode subscripts](#)₀₁₂₃₄₅₆₇₈₉

A long paragraph of text. Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in

reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.

Putting each sentence on its own line has numerous benefits with regard to [editing](#) and [version control](#).

Line break without starting a new paragraph by putting two spaces at end of line.

Document organization

Document section headings:

Heading 1

Heading 2

Heading 3

Heading 4

Heading 5

Heading 6

A heading centered on its own printed page

Horizontal rule:

Heading 1's are recommended to be reserved for the title of the manuscript.

Heading 2's are recommended for broad sections such as *Abstract*, *Methods*, *Conclusion*, etc.

Heading 3's and Heading 4's are recommended for sub-sections.

Links

Bare URL link: <https://manubot.org>

[Long link with lots of words and stuff and junk and bleep and blah and stuff and other stuff and more stuff yeah](#)

[Link with text](#)

[Link with hover text](#)

[Link by reference](#)

Citations

Citation by DOI [[1](#)].

Citation by PubMed Central ID [[2](#)].

Citation by PubMed ID [[3](#)].

Citation by Wikidata ID [[4](#)].

Citation by ISBN [[5](#)].

Citation by URL [[6](#)].

Citation by alias [[7](#)].

Multiple citations can be put inside the same set of brackets [[1](#),[5](#),[7](#)]. Manubot plugins provide easier, more convenient visualization of and navigation between citations [[2](#),[3](#),[7](#),[8](#)].

Citation tags (i.e. aliases) can be defined in their own paragraphs using Markdown's reference link syntax:

Referencing figures, tables, equations

Figure [1](#)

Figure [2](#)

Figure [3](#)

Figure [4](#)

Table [1](#)

Equation [1](#)

Equation [2](#)

Quotes and code

Quoted text

Quoted block of text

Two roads diverged in a wood, and I—
I took the one less traveled by,
And that has made all the difference.

Code `in the middle` of normal text, aka `inline code`.

Code block with Python syntax highlighting:

```
from manubot.cite.doi import expand_short_doi

def test_expand_short_doi():
    doi = expand_short_doi("10/c3bp")
    # a string too long to fit within page:
    assert doi == "10.25313/2524-2695-2018-3-vliyanie-enhansera-copia-i-
        insulyatora-gypsy-na-sintez-ernk-modifikatsii-hromatina-i-
        svyazyvanie-insulyatornyh-belkov-vtransfetsirovannyh-geneticheskikh-
        konstruktsiyah"
```

Code block with no syntax highlighting:

```
Exporting HTML manuscript
Exporting DOCX manuscript
Exporting PDF manuscript
```

Figures



Figure 1: A square image at actual size and with a bottom caption. Loaded from the latest version of image on GitHub.



Figure 2: An image too wide to fit within page at full size. Loaded from a specific (hashed) version of the image on GitHub.



Figure 3: A tall image with a specified height. Loaded from a specific (hashed) version of the image on GitHub.



Figure 4: A vector `.svg` image loaded from GitHub. The parameter `sanitize=true` is necessary to properly load SVGs hosted via GitHub URLs. White background specified to serve as a backdrop for transparent sections of the image.

Tables

Table 1: A table with a top caption and specified relative column widths.

<i>Bowling Scores</i>	Jane	John	Alice	Bob
Game 1	150	187	210	105
Game 2	98	202	197	102
Game 3	123	180	238	134

Table 2: A table too wide to fit within page.

	Digits 1-33	Digits 34-66	Digits 67-99	Ref.
pi	3.14159265358979323846264338327950	288419716939937510582097494459230	781640628620899862803482534211706	piday.org
e	2.71828182845904523536028747135266	249775724709369995957496696762772	407663035354759457138217852516642	nasa.gov

Table 3: A table with merged cells using the `attributes` plugin.

	Colors	
Size	Text Color	Background Color
big	blue	orange
small	black	white

Equations

A LaTeX equation:

$$\int_0^\infty e^{-x^2} dx = \frac{\sqrt{\pi}}{2} \tag{1}$$

An equation too long to fit within page:

$$x = a + b + c + d + e + f + g + h + i + j + k + l + m + n + o + p + q + r + s + t + u + v + w + x + y + z + 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 \tag{2}$$

Special

⚠ WARNING *The following features are only supported and intended for `.html` and `.pdf` exports. Journals are not likely to support them, and they may not display correctly when converted to other formats such as `.docx`.*

LINK STYLED AS A BUTTON

Adding arbitrary HTML attributes to an element using Pandoc’s attribute syntax:

Manubot Manubot Manubot Manubot Manubot. Manubot Manubot Manubot Manubot. Manubot Manubot Manubot. Manubot Manubot. Manubot.

Adding arbitrary HTML attributes to an element with the Manubot `attributes` plugin (more flexible than Pandoc’s method in terms of which elements you can add attributes to):

Manubot Manubot Manubot Manubot Manubot. Manubot Manubot Manubot Manubot. Manubot Manubot Manubot. Manubot Manubot. Manubot.

Available background colors for text, images, code, banners, etc:

white lightgrey grey darkgrey black lightred lightyellow lightgreen lightblue lightpurple red orange yellow green blue purple

Using the [Font Awesome](#) icon set:

✓ ? ★ 🔔 ✖ …

Light Grey Banner

useful for *general information* - manubot.org

Blue Banner

useful for *important information* - manubot.org

Light Red Banner

useful for *warnings* - manubot.org

Parameters

Column A/ Component 1: Cement

Cement is an adhesive substance that acts as a binder for all the components in a concrete mix. Ordinary Portland Cement (OPC) is made up of limestone, clay, and iron ore; and it is most commonly used. According to the ASTM standard, there are five types of cement, the difference due to the chemical composition, altering the properties. In this dataset, Type 1 Ordinary Portland Cement will be used. The unit used is kg of cement per 1 m³ of the concrete mixture (kg/m³ of mixture).

Column B/ Component 2: Blast Furnace Slag

Blast furnace Ash is a nonmetallic co-product obtained in the production of iron, iron ore, iron scrap and fluxed. It is commonly used in cement production as a substitute for clinker and in concrete production as a substitute for aggregates. The use of slag cement improves performance and durability of concrete. The unit used is kg of per 1 m³ of the concrete mixture (kg/m³ of mixture).

Column C/ Component 3: Fly Ash

Fly Ash is byproduct of burning pulverized coal in electric generation. It is a fine powder used to improve the workability, the strength and the durability of Portland Cement Concrete. It also decreases the water demand of the concrete mix and reduces heat of hydration. The unit used is kg of per 1 m³ of the concrete mixture (kg/m³ of mixture).

Column D/ Component 4: Water

Water content is the most important factor affecting the consistency of fresh concrete. The higher the water content, the higher the workability but the lower the strenght of the concrete. The unit used is kg per 1 m³ of the concrete mixture (kg/m³ of mixture).

Column E/ Component 5: Superplasticizer

Superplasticizers are chemical compounds used to reduce the amount of water content in the concrete mixture to produce high-strength concrete while maintaining enough workability. The used unit is kg of the superplasticizer to 1 m³ of the concrete mixture (kg/m³ of mixture).

Column F/ Component 6: Coarse Aggregate

Coarse Aggregates are inert, granular, and inorganic material. Coarse Aggregates are aggregates that are larger or equal to the ASTM sieve size 4.75mm. Typical coarse aggregates are gravel, crushed stone or previously used concrete etc. They occupy a large volume in a concrete mix (~65-75%), as it acts as an economic filler for cement. The unit used is kg of coarse aggregate per 1 m³ of the concrete mixture (kg/m³ of mixture).

Column G/ Component 7: Fine Aggregate

Fine Aggregates are inert, granular, and inorganic material. Fine Aggregates are aggregates that are smaller than the ASTM sieve size 4.75mm. Typical fine aggregates are sand, crushed stone or burnt clays etc. The fine aggregates fill in the voids between coarse aggregates. It also provides resistance against shrinking and cracking. The unit used is kg of fine aggregate per 1 m³ of the concrete mixture (kg/m³ of mixture).

Column H/ Component 8: Age

This column represents the age of the concrete mixture after pouring. The concrete gains its strength gradually with time, and according to the ASTM, it reaches to 99% of the target compressive strength after 28 days. The strength will continue to increase after years and it can become larger than the target compressive strength (strength percent > 100%). The unit of this column data is in days.

Column I/ Output 1: Concrete compressive strength

It is the capacity of concrete to withstand compression load before failure. Again, based on the ASTM standards, this property reported at 28 days of curing time.

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