

Time Series
Managing the practical
stuff

Julia Crawford
Waitheke High School

Why modelling? "There are no models"
Building the data for the model and the
model itself. Getting the data often
great opportunity of statistical model and
model.

It is often in a separate statistical setting within a
model. For example, the model is often used to
predict the future. For example, the model is often used to
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A Time Series Investigation

• Underpins the teaching and learning throughout the course
• I use Polar Ice data ... but can use any rich data set that your students can engage with.

Step 1: Introduction

What is time series?
Quick look at the data set ... What is it about?
What variables do we have?
Launch into some research...

This workshop: Where are we heading?

- Setting the tone for the internals and our statistical learning. Getting the year off to a good start in terms of statistical research and writing.
- Strategies to integrate statistical learning within a master project (Polar Ice)
- Developing student writing and research skills.
- Google docs to help manage learning and assessment.
- How I manage assessment.
- A marking rubric.

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Research

Step 2: Purpose and Variables

Ideas from Neil Marshall's AMA workshop 2013

Research & Share

- Online research about Polar Ice.
- Encourage wide ranging and general research.
- Students offer examples of articles.
- Cut and paste into google doc and 'share'.

Read & Highlight

- Print single sided copies of articles.
- Divide into groups of 3-4 students.
- Each group gets a copy of each article.
- Read, highlight interesting points (colour for referencing).

Collate & Group Ideas

- Cut out highlighted sections.
- Organise highlighted text into groups according to themes for common ideas.

Develop Purpose

- Review with respect to the data set.
- Develop the purpose linked to aspects of the research.
- Reference.
- Identify variable(s) linked to the purpose.

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Features of Time Series

Step 3: Analysis

- Explore the data: iNZight.
- Use Polar Ice to practise analysis in iNZight and writing in the report. Give feedback at each stage.
- 2015: will use videos and exercises from Future Learn: data-to-insight.

Features

- Long term trend in context and references.
- Seasonal variation in context with link to references.
- Decompose and recompose, discussion of model appropriateness.
- (Comparison to other series).
- Forecasts, interval, evaluation, link to context & research.

Vocab Activity

Year	Value
2000	100
2001	105
2002	110
2003	115
2004	120
2005	125
2006	130
2007	135
2008	140
2009	145
2010	150
2011	155
2012	160
2013	165
2014	170
2015	175

Data-to-insight



Features

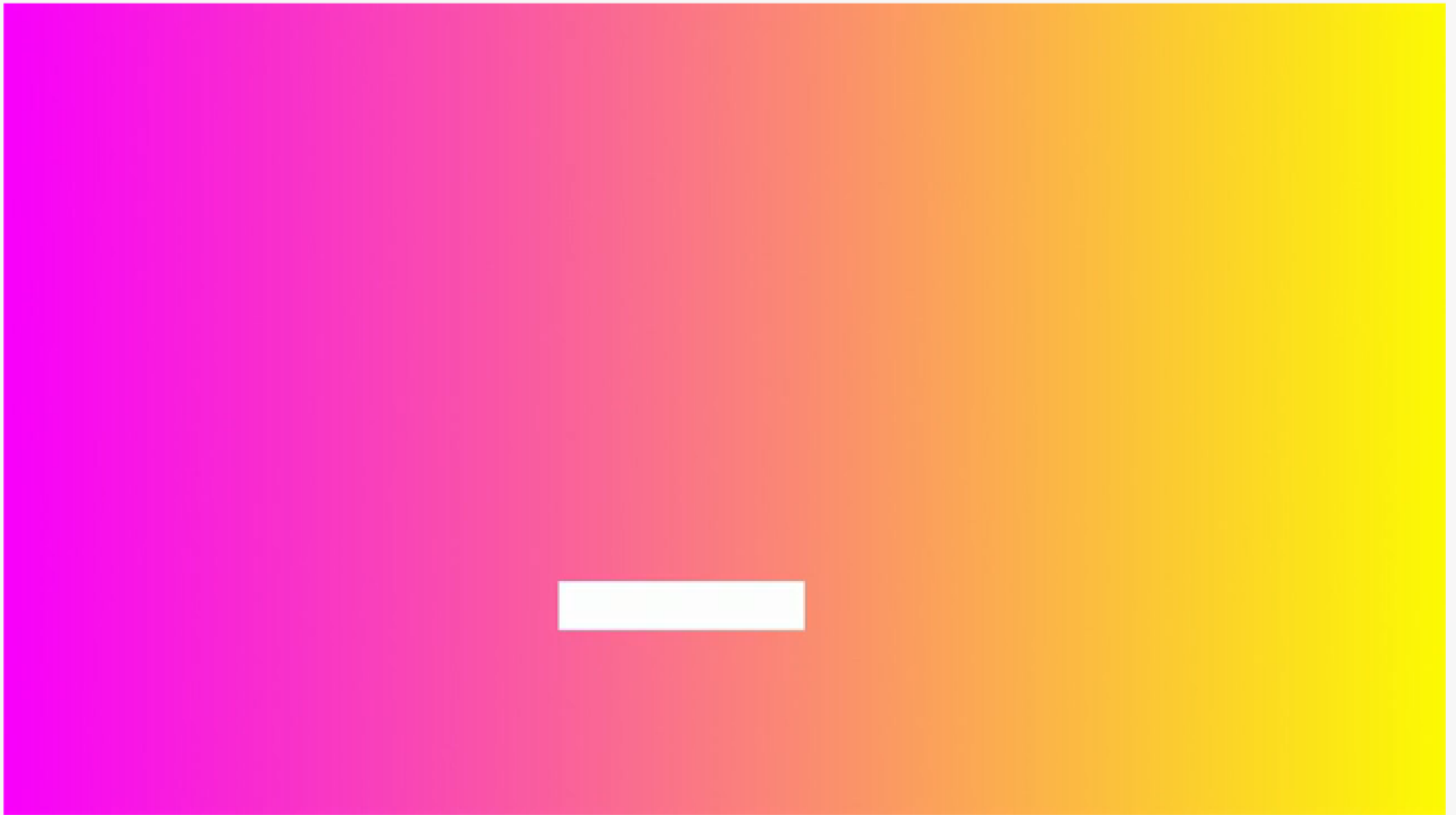
- *Long term trend* in context and references.
- *Seasonal* variation in context with link to references.
- Decompose and recompose, discussion of *model* appropriateness.
- (Comparison to other series).
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Vocab Activity

Time Series Glossary (from Future Learn: Data to Insight)

Additive decomposition	Breaking a time series down into 3 parts, trend, seasonal effects and residuals where it is assumed that there are <i>constant underlying seasonal swings</i> (e.g. of the same size every year) <i>that add to the trend value.</i>
Confidence bands	A band around a time-series forecast to allow for uncertainty. (They do not allow for uncertainties about the realism of the assumptions that went into the prediction.)
Decomposition plot	A plot built up of 3 parts, the basic Time Series plot with trend, the Seasonal Swing (additive or multiplicative) and the Residuals.

Data-to-insight



Giving Feedback

- Students need to practice writing and refining their writing.
- Need to give feedback regularly to individuals.
- I use Google Docs.
- Students share their writing and it's easy to comment using comment boxes.
- Students can also share in a small group and work together on one document.

Structure the report

Link the structure and order within the report to the PPDAC cycle. Use templates to scaffold student writing.

- *Purpose*
- *Data*
- *Analysis*
- *Conclusion*

Weave the context and research into each element of the cycle.

Assessment Organisation

- 1 week open book assessment task (5 periods of class time students can access work from home).
- Create a Google doc for each student that I own and 'share' with them.
- Allows real research as analysis evolves.
- I can monitor progress and can access Revision History
- Last Day of classtime: Masterchef Moment.

Marking

- Read the standard again
- Read the exemplars again
- Read the schedule again
- My Marking Rubric
- The final check for Excellence
- Annotate the rubric and the script

Time Series Marking Rubric

Name: _____

	Achieved	Merit	Excellence
Purpose/Research	Purpose Stated Selected variable	+ evidence of research Justified choice of variable (s)	+ discussion of context/research in developing purpose & selecting variable(s)
Graph	Graph with raw & smoothed line (trend line)	Graph with smoothed line (trend line) + title, correctly labelled axes and any series shown on the graph clearly identified	
Model	Appropriate model decomposition (or re-composition) graph shown and briefly discussed OR graph of smoothed data	+ appropriateness of model is discussed throughout the range of x-values (evidence can be found in discussion of forecast accuracy)	+consider other models eg piecewise or multiplicative OR remove last values and check forecast as a way to justify the model
Features	2 or more features of the time series discussed in context. eg long term trend Seasonal variation Residuals		+ other relevant features identified + discussion of features in context linking to research & possible explanations
Forecast	Forecast made using INZight. Single value or interval	+ forecast in context with correct units and appropriate rounding +discussion of accuracy of forecast linked to statistical evidence +demonstrated understanding that the forecast is an estimate	+ comparison with real data OR remove last values and check forecasts
Conclusion	Conclusion consistent with the purpose	+ contextual support for the conclusion + each component of PPDAC cycle communicated	+conclusion linked to purpose using contextual references throughout report +reflection wrt findings and research + review impact of findings or compare with other time series
Final Review for Excellence			Integrated statistical knowledge and contextual knowledge
Overall Grade	Achieved	Merit	Excellence

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Final Review for Excellence			Integrated statistical knowledge and contextual knowledge
Overall Grade	Achieved	Merit	Excellence



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Fabulous Time Series Reports



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