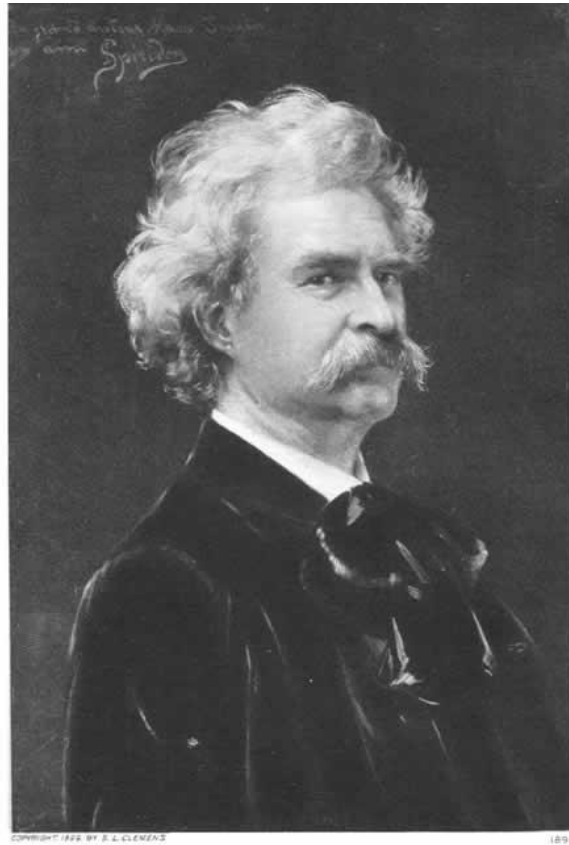


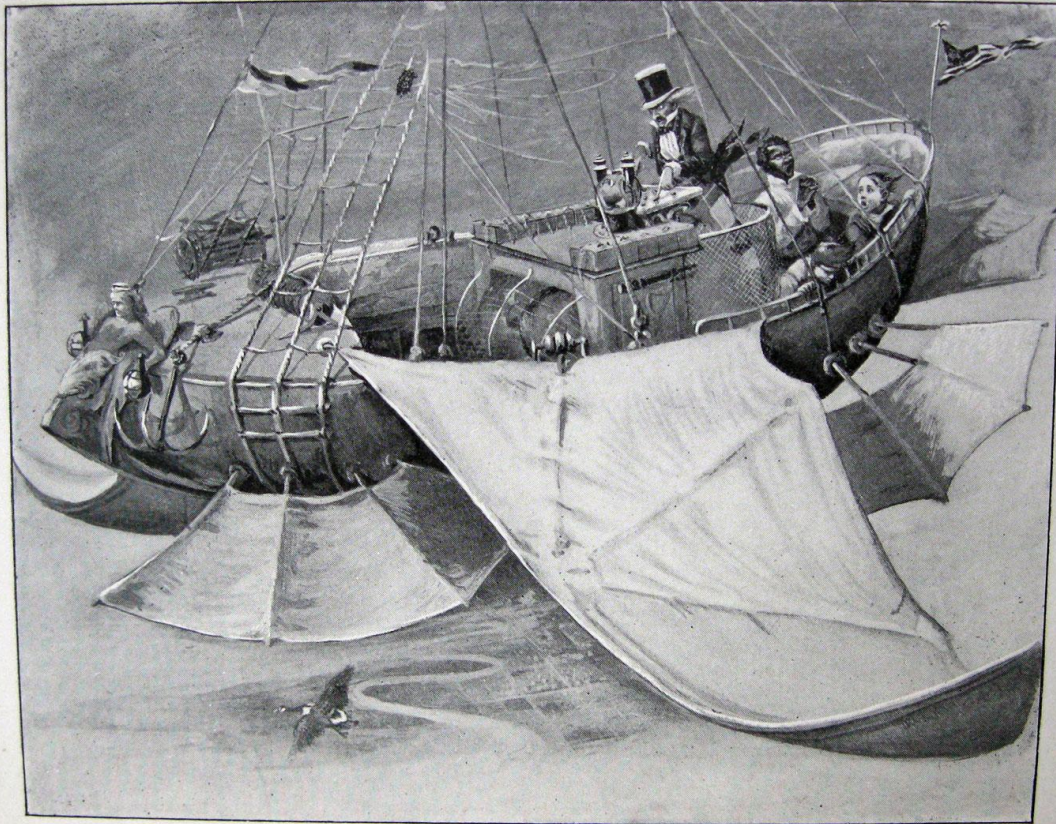
CSCE 420: Artificial Intelligence

Dr. Dylan Shell



Tom Sawyer Abroad

From Mark Twain 1894 "Tom Sawyer Abroad" — Illustrated by Dan Beard (1st edition)



“HE SAID HE WOULD SAIL HIS BALLOON AROUND THE WORLD.”

“ Well, then, it’s just as I reckoned. The professor lied.”

“ Why?”

“ Because if we was going so fast we ought to be past Illinois, oughtn’t we?”

“ Certainly.”

“ Well, we ain’t.”

“ What’s the reason we ain’t?”

“ I know by the color. We’re right over Illinois yet. And you can see for yourself that Indiana ain’t in sight.”

“ I wonder what’s the matter with you, Huck. You know by the *color*?”

“ Yes, of course I do.”

“ What’s the color got to do with it?”

“ It’s got everything to do with it. Illinois is green, Indiana is pink. You show me any pink down here, if you can. No, sir; it’s green.”

“The map is not the territory.” – Alfred Korzybski

A student of mine asked me to day to give him a reason for a fact which I did not know was a fact - and do not yet. He says that, if a figure be any how divided and the compartments differently coloured so that figures with any portion of common boundary line are differently coloured - four colours may be wanted but not more - The following

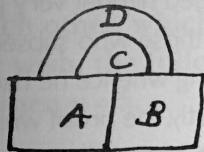
October 23, 1852: Augustus De Morgan writes to Sir William Rowan Hamilton

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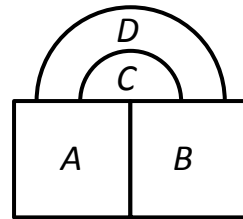
A B C D are names of colours



Query cannot a necessity for five or more be invented

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Francis Guthrie

Tinting Maps.—In tinting maps, it is desirable for the sake of distinctness to use as few colours as possible, and at the same time no two conterminous divisions ought to be tinted the same. Now, I have found by experience that *four* colours are necessary and sufficient for this purpose,—but I cannot prove that this is the case, unless the whole number of divisions does not exceed five. I should like to see (or know where I can find) a general proof of this apparently simple proposition, which I am surprised never to have met with in any mathematical work. F. G.

Figure 1: Letter in *The Athenæum* of June 10, 1854.



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Figure 1: Letter in *The Athenæum* of June 10, 1854.

??

Francis Galton



Alfred Bray Kempe

Most famous fallacious proof in the whole of mathematics.

Believed to be true for 11 years, and was the starting point for many subsequent proofs.

Percy John Heawood found a counterexample.



Heinrich Heesch's Box of Reducible Configurations

From Robin Wilson's "Four Colors Suffice"

Solution in 1976 by Kenneth Appel and Wolfgang Haken

The first major theorem to be proven with extensive computer assistance

Aroused considerable controversy



Hardness

It is NP-Complete to decide whether a graph admits a coloring with k colors, except for $k=1$ and $k=2$.

Also: Zuckerman, D. (2007), "[Linear degree extractors and the inapproximability of Max Clique and Chromatic Number](#)", Theory of Computing 3: 103–128.

He showed that unless $P=NP$, no poly-time algorithm computes the chromatic number of a graph with n vertices up to a factor of $n^{1-\varepsilon}$ for any fixed $\varepsilon > 0$.

- **Allocating frequencies to mobile phone cells**
- **Laying out components on circuit board**
- **Fitting a protein structure to measurements**
- **Drawing up an examination timetable**

Sources:

Tom Sawyer Images:

<http://www.bellsbooks.com/wp-content/uploads/2011/10/Tom-Sawyer-Abroad-Illustration-21.jpg>

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Francis Guthrie:

By Paul venter - http://en.wikipedia.org/wiki/Image:Francis_guthrie.jpg

Alfred Bray Kempe

http://aprender-mat.info/history/photos/Kempe_3.jpeg

Kenneth Appel and Wolfgang Haken

<http://ebulten.library.atilim.edu.tr/shares//images/M3.png>