Level-of-Detail Typesetting of Academic Publications

Tom Murphy VII, Tom Murphy VII, Tom Murphy VII, Tom Murphy VII, Tom Murphy VII, Tom Murphy VII, Tom Murphy VII, Tom Murphy VII, Tom Murphy VII, …

Abstract

One of the chief problems facing academic researchers in all areas of study are the harsh page-limits imposed by conference proceedings and journals. Under such constraints, ideas of large size simply must be truncated to fit. In paper we present a new text layout methodology called Level of Detail Typesetting that allows for ideas of any size to be expressed in any Draconian page limit without truncation. The technology allows the graceful degradation of presentation quality as the page limit decreases.

Introduction

Faced with the harsh page-limits of the academic publishing industry, scientists are routinely forced to limit the amount of information in published papers. This means that important technical exposition, proofs, figures, citations, footnotes, appendices, and non sequiturs must invariably be cut from a paper prior to publication. This leads to billions of dollars in public and private research grants ultimately being sent to the ''cutting room floor.''

There are a number of traditional solutions to this problem.

The classic solution is to produce a separate ''deleted scenes'' paper (often called a ''technical report'' for historic reasons) that includes any text that was excised during the editing process. A minority of researchers publish their entire CVS or Subversion revision history (Murphy 2007). This approach suffers several drawbacks: At least two versions of the paper must be simultaneously maintained; a reader must acquire both to achieve all knowledge; technical reports are not usually subject to peer review, thwarting the academic process; and university publication standards may still yet limit the length of a technical report.

Another solution from the news wire industry is the ''pyramid model'' where information is presented in a strictly more-to-less important order, so that any prefix of an article maximizes the content value for that number of characters. This allows the publisher to print exactly as much of the article as can fit in the space available. This technique also suffers drawbacks, mainly that the natural textual flow can be interrupted by this prioritization. Additionally, the pyramid model does not well accommodate mainstays of the academic model such as figures, citations, and politically necessary acknowledgement sections.

Modern typesetting has rendered the pyramid model obsolete. The inspiration for this technology comes from the letterlaying regime used in the Star Wars Movie (Lucas 1977). In the opening scene text is displayed to us at an angle, receding to the vanishing point. Were our eyesight sufficiently acute, we would be able to read further and further into the distance; since the Star Wars Movie begins on ''Episode 4'' it is even suggested to us that the plot summaries for Episodes 3 through negative infinity in fact are written in yellow stardust on that very horizon. Yet all of this takes place in the finite two-dimensional area of the silver screen! Although such technology was once thought to be exclusively the purview of Space, we now know how to emulate it in print.

Content Attenuation

The primary technology we employ is the ability for modern computers to render typefaces at arbitrary size. Each section, paragraph, sentence, or word, is prioritized by its worth as in the pyramid scheme. Then, successive components of that prioritized string are rendered at progressively decreasing type sizes so as to fit in an arbitrary amount of space.

To illustrate the concept, this paragraph contains a list of the things that the author ate today, in decreasing importance: Big Mac, McDLT, a quarter pounder with some cheese, Filet-O-Fish, a hamburger, a cheeseburger, a Happy Meal, McNuggets, tasty golden french fries (in regular and larger sizes) and salads chef or garden, or a chicken salad oriental, big big breakfasts, egg McMuffins, hot hot cakes and sausage, maybe biscuits, bacon egg and cheese, or sausage danish hash browns too, and for dessert: hot apple pie, or sundaes three varieties a soft serve cone, three kinds of shake, or chocolately chip cookies and to drink a Coca-Cola Diet Coke or orange Sprite and coffee (decaf too) and also orange juice; I love McDonald's, good time, great taste and I get this all at one place. Also: Alcoholic beverage, Almonds, Amaranthus, American cheeses, Apple, Apple cultivars, Appetizer, Baby food, Beans/Legumes, Chickpeas, Broad beans, Lentils, Peas, Peanuts, Phaseolus beans, Soybeans, Sweet peas (Lathyrus), Beef, Beverage, Alcoholic beverage, Coffee, Energy drink, Espresso, Fictional beverages, Foodshake, Juice, Korean beverages, Milk, Milkshake, Non-alcoholic drink, Slush, Soft drink, Sparkling water, Sports drink, Tea, Water, Biscuit, brands, Brands of biscuit, Bread, Breakfast cereals, British cheeses, Cakes, Carbohydrates, Carbonated water, Carob, Catsup, Cereal, Barley, Buckwheat, Kamut, Maize, Oats, Rice, Rye, Sorghum, Spelt, Triticale, Teff, Wild rice, Wheat, Cereals, breakfast, Cheeses, Cheeses, American, Cheeses, British, Cheeses, French, Cheeses, Swiss, Chinese dishes, Christmas dishes, Citrus, Cocoa, Coconuts, Coffee, Comfort food, Condiments, Confectionery, Convenience food, Coriander, Cuisine, Dabbawala, Dairy product, Delicacies, Dessert, Dietary supplements, Diet food, Dishes:, 12-dishes Christmas Eve Supper, Dishes, Chinese, Dishes, Colorado, Dishes, egg, Dishes, Italian, Dishes, Indian, Dishes, Moroccan, Dried foods, Drinks (See also Beverages), Drupe, Durian seeds, Egg, Egg dishes, Energy drink, Espresso, Fast food, Fat, Fictional beverages, Finger food, Fish, Fish, Flavoring, Food, Food additive, Food additives, Food additives, Codex Alimentarius, Food, fast, Food groups, Food names, misleading, Food, organic, Food pyramid, Food preservatives, Foods, Foods named after people, Food pairs, Food, slow, Foods, snack, Foods, vegan, Foods, wild, French cheeses, Frozen food, Fruit, Fruit, tropical, Fruits, Genetically modified food, Ginkgo, Grain, Hazelnut, Herb and spice, Herbs and spices, Hors d'oeuvre, Ingredient, Japanese instant noodles, Japanese snacks, Juice, Junk food, Ketchup, Korean beverages, Legumes, Local food, Mango cultivars, Meat, Milk, Misleading food names, Monkey-puzzle, Mushroom, edible, Mustard, Mustards, Non-alcoholic beverage, Noodles, Noodles, Japanese instant, Novel food, …

After that exhaustive list, the paper can proceed with the proper flow by restoring the normal font size. The attenuation function can be chosen more or less arbitrarily. A simple choice halves the font size after n characters, then $n/2$ characters, then $n/4$ characters, etc., ensuring that an infinite amount of text can fit in a small finite space determined by n and the starting font size.

Extensions

This technique proves useful for most documents, but not all ideas can be easily expressed in linear form. For instance, many academic documents contain (or would contain, if not for the limitations of their primitive 1960s typesetting applications) footnotes, with footnotes annotating those footnotes, footnotes on those footnotes, footnotes upon those footnotes, and upon those footnotes more footnotes, which themselves have a variety of footnotes, and in those very little footnotes some more even smaller footnotes, which's minutiae is also augmented by superscript numerals denoting notes at the foot, who themvelves are described by footnotes, on top of which footnote daggers and asterisks have been laid, and those notes also not immune to footnotery, and indeed again the footnotes are noted, not to mention those themselves footnotes which are supplemented, and those notes shall not be ''left'' without ''two feet'', etc.

Because the amount of text in such systems can be uncountably infinite, an extension to our system is necessary to allow for their layout. This extension is based on L-systems (Reed 1998). Using, for example, the Sierpinski triangle, we can lay out an arbitrary infinite nesting of footnotes, assuming a footnote is less important than the footnote it annotates.

We begin by writing our text line as in Figure 1. At the point we wish to insert a footnote, we make a small diagonal diversion from the line, on which the footnote is displayed (Figure 2). Such footnote lines support footnotes themselves (Figure 3), etc.

One possible drawback of such layouts is that while they accommodate an infinite amount of text, they use zero area, tending towards a page that is completely blank in the limit. For future work, we believe layout schemes could be devised based on space-filling curves such as the Hilbert Curve (Figure 4); for infinite amounts of text such curves produce aesthetically pleasing completely black pages (Figure 5).

Conclusions

Unencumbered by the constraints of having to produce a concise summary of this work, we instead repeat it in its entirety so as not to leave anything out.

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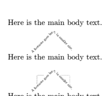

Figures 1, 2, 3. Fractal layout of footnotes using the Sierpinski Curve.

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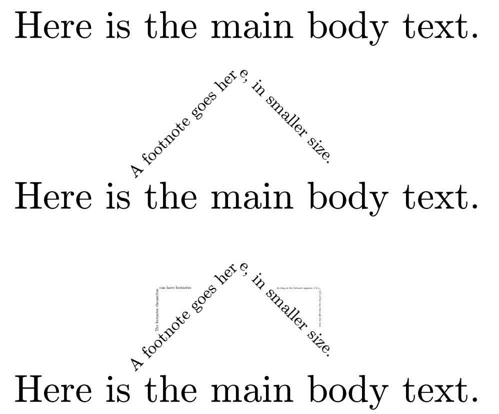
Acknowledgements

The author wishes to acknowledge all persons born in the year 1979, in alphabetical order: Vitalij Aab, Aaliyah, Carlton Aaron, Moonika Aava, M. Haroon Abbas Qamar, Khalid Abdullah (American football player), Abdullah Abdulqadirakhum, ?ric Abidal, Fabrice Abriel, Hocine Achiou, Oliver Ackland, Amy Adams (singer), Blue



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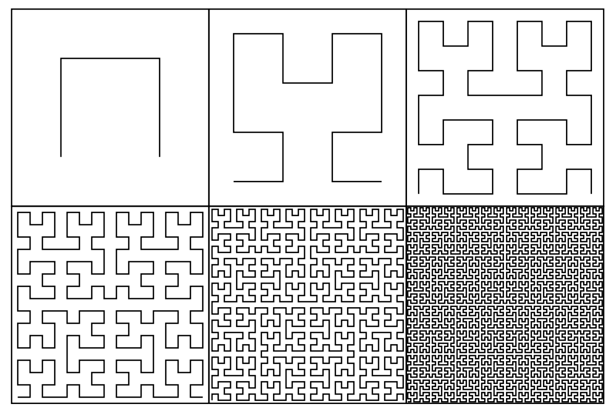

Figure 4. The Hilbert Curve.

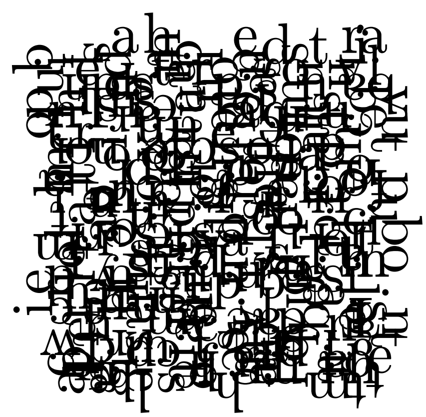

Figure 5. Text aesthetically laid out on a Hilbert Curve.

Adams, Charlie Adams, Keith Adams (American football), Kelly Adams, Baba Adamu, Omri Afek, Joseph Afful, Maxim Afinogenov, Afrob, Nazanin Afshin-Jam, Carlos Agassi, Agent M, Naroa Agirre, Junior Agogo, Alessandro Agostini, Bj?rn ?gren, Perro Aguayo, Jr., Chris Aguila, Marvin Agust?n, Ahmad Hassan Stakoza, Pablo Aimar, Donna Air, Souad A?t Salem, Jepkorir Aiyabei, Orhan Ak, Jimmie ?kesson, Abdulah Al Hamiri, Fawaz al-Rabeiee, Saleh Al-Saqri, Muhammad Aladdin, Alan Os?rio da Costa Silva, Carlo Alban, Christijan Albers, Marko Albert, Chris Albright, Hugo Alcantara, Alessandro Mori Nunes, Dan Alexa, Gary Alexander (footballer), Todd Alexander, ...

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