

Meta Analysis of Amplification Technique and P2PTV Amplifications

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Abstract - In statistics, a meta-analysis combines the results of several studies that address a set of related research hypotheses. In its simplest form, this is normally by identification of a common measure of effective size for which a weighted average might be the output of a meta-analysis. Here the weighting might be related to sample sizes within the individual studies. More generally there are other differences between the studies that need to be allowed for, but the general aim of a meta-analysis is to more powerfully estimate the true "effect size" as opposed to a smaller "effect size" derived in a single study under a given single set of assumptions and conditions.

I. INTRODUCTION

Meta-analysis is often, but not always, important components of a systematic review procedure. Here it is convenient to follow the terminology used by the Cochrane Collaboration and use "meta-analysis" to refer to statistical methods of combining evidence, leaving other aspects of 'research synthesis' or 'evidence synthesis', such as combining information from qualitative studies, for the more general context of systematic review.

II. RELATED WORK

The first meta-analysis was performed by Karl Pearson in 1904, in an attempt to overcome the problem of reduced statistical power in studies with small sample sizes; analyzing the results from a group of studies can allow more accurate data analysis. However, the first meta-analysis of all conceptually identical experiments concerning a particular research issue, and conducted by independent researchers, has been identified as the 1940 book-length publication. Extra-sensory perception after sixty years authored by Duke University psychologists J. G. Pratt, J. B. Rhine and associates. This encompassed a review of 145 reports on ESP experiments published from 1882 to 1939, and included an estimate of the influence of unpublished papers on the overall effect (the file-drawer problem). Although meta-analysis is widely used in epidemiology and evidence-based medicine today, a meta-analysis of a medical treatment was not published until 1955. In the 1970s, more sophisticated analytical techniques were introduced in educational research starting with the work of Gene V. Glass, Frank L. Schmidt and John E. Hunter.

Gene V Glass was the first modern statistician to formalize the use of meta-analysis, and is widely recognized as the modern founder of the method. The online Oxford English Dictionary lists the first usage of the term in the statistical sense as 1976 by Glass. The statistical theory surrounding meta-analysis was greatly advanced by the work of Nambury S. Raju, Larry V. Hedges, Harris Cooper, Ingram Olkin, John E. Hunter, Jacob Cohen, Thomas C. Chalmers, Robert Rosenthal and Frank L. Schmi.

III. EXPERIMENTAL DESIGN

A current-to-voltage converter (or transimpedance amplifier) is an electrical device that takes an electric current as an input signal and produces a corresponding voltage as an output signal. Three kinds of devices are used in electronics: generators (having only outputs), converters (having inputs and outputs) and loads (having only inputs). Most frequently, electronic devices use voltage as input/output quantity, as it generally requires less power consumption than using current.

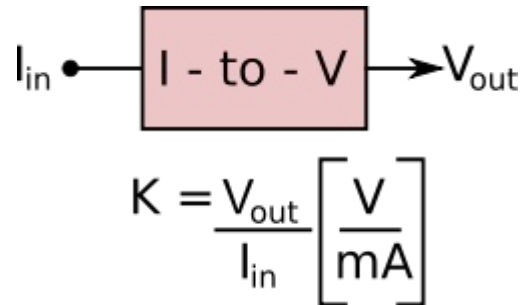


Figure1. Current-to-voltage converter (a block diagram)

In some cases, there is a need for converters having current as the input and voltage as the output. A typical situation is the measuring of current using instruments having voltage inputs. A current-to-voltage converter circuit that performs current to voltage transformation.

In electronic circuitry operating at signal voltages, it usually changes the electric attribute carrying information from current to voltage. The converter acts as a linear circuit with transfer ratio $k = V_{OUT}/I_{IN}$, called the transimpedance, which has dimensions of $[V/A]$ (also known as resistance). That is why the active version of the circuit is also referred to as a transresistance or transimpedance amplifier.

Typical applications of current-to-voltage converter are measuring currents by using instruments having voltage inputs, creating current-controlled voltage sources, building various passive and active voltage-to-voltage converters, etc. In some cases, the simple passive current-to-voltage converter works well; in other cases, there is a need of using active current-to-voltage converters. There is a close interrelation between the two versions - the active version has come from the passive one. Ideal current-to-voltage converters have zero input resistance (impedance), so that they actually short the input source. Therefore, in this case, the input source has to have some resistance; ideally, it has to behave as a constant current source. Otherwise, the input source and the current-to-voltage converter can saturate.

IV. P2PTV APPLICATION

The term P2PTV refers to peer-to-peer (P2P) software applications designed to redistribute video streams in real time on a P2P network; the distributed video streams are typically TV channels from all over the world but may also come from other sources. The draw to these applications is significant because they have the potential to make any TV channel globally available by any individual feeding the stream into the network where each peer joining to watch the video is a relay to other peer viewers, allowing a scalable distribution among a large audience with no incremental cost for the source.

In a P2PTV system, each user, while downloading a video stream, is simultaneously also uploading that stream to other users, thus contributing to the overall available [bandwidth](#). The arriving streams are typically a few minutes time-delayed compared to the original sources. The video quality of the channels usually depends on how many users are watching; the video quality is better if there are more users.

The architecture of many P2PTV networks can be thought of as real-time versions of Bit-Torrent: if a user wishes to view a certain channel, the P2PTV software contacts a "tracker server" for that channel in order to obtain addresses of peers who distribute that channel; it then contacts these peers to receive the feed. The tracker records the user's address, so that it can be given to other users who wish to view the same channel. In effect, this creates an overlay network on top of the regular internet for the distribution of real-time video content.

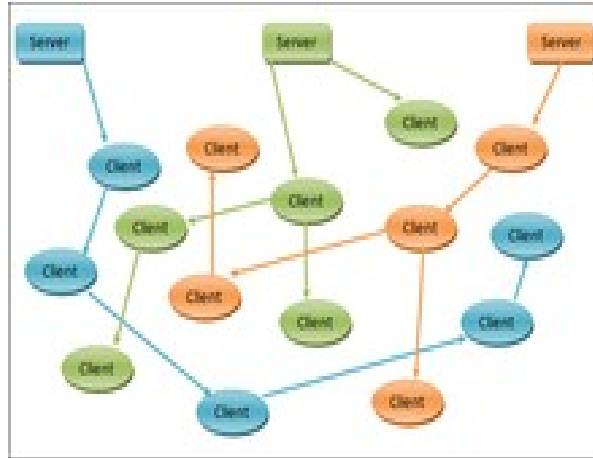


Figure 2. P2PTV overlay network serving three video streams.

The need for a tracker can also be eliminated by the use of distributed hash table technology. Some applications allow users to broadcast their own streams, whether self-produced, obtained from a video file, or through a TV tuner card or video capture car. Many of the commercial P2PTV applications were developed in China (TVU-Player, PP-Live, QQ-Live, PP-Stream). The majority of available applications broadcast mainly Asian TV stations, with the exception of TVU-Player, which carries a number of North American stations including CBS, Spike TV, and Fox News. Some applications distribute TV channels without a legal license to do so; this utilization of P2P technology is particularly popular to view channels that are either not available locally, or only available by paid subscription, as is the case for some sports channels.^[1] By January 2009, there were about 14,000 P2P channels on PP-Stream

V.RESULTS AND DISCUSSIONS

Here we will discuss how to calculate the effect size g and its correction d . For convenience sake we will assume that your contrast will be defined as (experimental group - control group). When considering the role of this difference in the design of the study we will call the variable differentiating these groups as the "treatment factor."² The simplest effect size based on mean differences is Cohen's g , defined as :

$$g = \frac{{}^1Y_e - {}^1Y_c}{s_p}$$

where 1Y_e is the mean of the experimental group, 1Y_c is the mean of the control group, and s_p is the pooled sample standard deviation.² While intuitive, the effect size g is actually a biased estimator of the population effect size

$$= \pm \frac{{}^1e - {}^1c}{\sqrt{4}}$$

Meta-analysts have also developed formulas to calculate g from a number of different test statistics which we will present below. If you chose to use one of these formulas you should remember to correct g for its sample size bias using formula presented above.

VI.CALCULATING CORRELATION EFFECT SIZES

Correlations are widely used outside of meta-analysis as a measure of the linear relationship between two continuous variables. The correlation between two variables x and y may be calculated as :

$$R_{xy} = \frac{\sum (Z_{xi})(Z_{yi})}{n}$$

Where Z_{xi} and Z_{yi} are the standardized scores of the x and y variables for case i . Correlations can range between -1 and 1. Correlations near -1 indicate a strong negative relationship, correlations near 1 indicate a strong positive relationship, while correlations near 0 indicate no linear relationship.

The correlation coefficient r is a slightly biased estimator of $\frac{1}{2}$, the population correlation coefficient. An approximation of the population correlation coefficient may be obtained from the formula

$$G(r) = \frac{r + r(1 - r^2)}{2(n - 3)}$$

VII. CRITICALLY EVALUATING THE RESEARCH WORK AND ITS FUTURE SCOPES

The first thing to examine is the internal validity of the primary research studies themselves. Ultimately, a meta-analysis can never be more valid than the primary studies that it is aggregating. If there are methodological problems with the studies then the validity of the meta-analysis should be equally called into question. ² The meta-analysis should contain enough studies to provide power for its test. The exact number will depend on what analyses are being performed. For most purposes you would want to have at least 30 studies. If a meta-analysis performs moderator tests it should also report if there are any relationships between the moderators. You should critically examine all results involving correlated moderators to see if there is a logical reason to doubt the interpretation of the results. Today, all meta-analyses will have at least two authors to ensure coding reliability. The reliability should be published, and should be reasonably high preferably over Standard meta-analytic procedures assume that all of the effect sizes are independent. If an analysis includes more than a single effect size per study, this assumption is violated. Sometimes the designs of the primary studies will require this violation, but the authors should take steps to minimize its impact on their results. Assumed 0 effect sizes from reported null findings are the least precise effects that can be calculated. You should be cautious when drawing inferences from a meta-analysis that contains a substantial amount of these effects. If there are a large number of assumed 0 effect sizes, the authors should report their results both including and excluding these values from their analyses.

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