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Poster #1

ANION EXCHANGE OF CHLORIDE IONS IN $Re_2(CH_3COO)_2Cl_4 \cdot 2H_2O$ AND $[Re_2(CH_3COO)_2(9\text{-ETAH})_2]Cl_4$

Adnan Anwar, Minh Phan, and Eric Sui

Rhenium metal complexes show anticancer activity which has been proposed to be the result of binding to purine nucleobases in DNA. This study uses 9-ethyladenine to simulate adenine in a natural system in which position nine is attached to the sugar-phosphate backbone of DNA. Reaction of $Re_2(O_2CCH_3)_2Cl_4 \cdot 2H_2O$, a quadruply bonded compound, with 9-ethyladenine results in the isolation of the product $[Re_2(OAc)_2(9\text{-EtAH})_2]Cl_4$. The focus of this research study is to isolate this product with a variety of anions. Anion exchange of the chloride ions in either the reactant or the product dimetal compounds will give us spectroscopic information and may enable us to isolate crystalline products. Infrared spectroscopy, mass spectrometry, and ^1H NMR spectroscopy will be used to characterize the products. The results of the different exchange reactions will be discussed.

Poster #2

EFFECT OF CHILD GENDER, BEHAVIORAL HISTORY, AND PARENTING STRATEGIES ON STRATEGY RATINGS

April Pyle

The effect of child gender, child behavioral history, and parenting strategies on college students' strategy ratings was studied. Participants included 49 female and 15 male private university students with a mean age of 19.73. Participants read one of four vignettes describing a boy or girl with either a history of acting out or good behavior. Then they completed the Discipline Strategies Questionnaire (DSQ) to measure the participants' strategy choice including negative, ignoring, rewarding, and talking strategies. There were no significant effects for gender or behavioral history. There was a significant difference between strategies in which rewarding and talking strategies were rated more appropriate than negative and ignoring strategies. There were no significant interactions. The findings suggest that college students do not hold gender stereotypes or behavioral history against children when deciding appropriate parenting strategies

Poster #3

COMPARING THE CONVENTIONS OF THE POPULAR BALLAD AND THE LITERARY BALLAD

Ashlie D'Errico

The aim of this project is to identify the formal elements that determine the style of the popular ballad and the literary ballad. Furthermore, this project will investigate the relationship between the traditional ballad and its predecessors, the literary ballad and the broadside ballad of the nineteenth century. Two representative popular ballads will be analyzed including the traditional ballad, "The Demon Lover" and the broadside ballad, "The New Poor Law Bill." Two representative literary ballads will be analyzed as well; these include S.T. Coleridge's "The Rime of the Ancient Mariner" and Oscar Wilde's "The Ballad of Reading Gaol." The methodologies of Stylistics, Linguistics and Pragmatics will be used to analyze the defining elements of each ballad and to examine the ballad as a conventional literary form.

Poster #4

IMPROVING PICHIA PASTORIS AS A FOREIGN PROTEIN EXPRESSION SYSTEM

Caryn Ng, Cynthia Wagner-Weick, Joan Lin-Cereghino, and Geoff Lin-Cereghino

The yeast *Pichia pastoris* is used to produce foreign proteins by various academic, commercial, and research organizations. The possibilities of the foreign proteins are numerous and beneficial. Although the yeast is popular to work with, there are several inherent difficulties which can hinder the final production of foreign proteins. The complete *P.pastoris* genome sequence is expected to be released early 2005. After the genome sequence is released it will provide the knowledge to alter this yeast genetically. Scientists who are improving *P.pastoris* as a protein production system need to identify the most urgent problem areas in order to know where to apply the genome sequence knowledge to make the yeast become a better host for heterologous expression. We conducted a survey asking various *P.pastoris* users their major problems working with the yeast and how that problem ranks compared to the others. After the data was collected, we then analyzed and ran various statistical analyses. Based on our findings we have narrowed the areas for future improvement to several common issues. The results will be shared with several research labs that are attempting to genetically engineer *P.pastoris* into a more user-friendly organism.

Poster #5

USING YEAST 2-HYBRID ANALYSIS TO EXAMINE THE ROLE OF THE FRUIT FLY GENE *DMXRCC2* IN MEIOSIS

Cathy Vo and Catharine Terauchi

In mammals, Rad51 is a protein that functions to promote crossovers in meiosis and DNA repair during mitosis. Rad51 utilizes the helper proteins Rad51B, Rad51C, Rad51D, XRCC2, and XRCC3. All these proteins are thought to work together to repair damaged DNA, but it is not known specifically how they interact. In mice, XRCC2 is expressed in testes and might also help in generating crossovers in meiosis. We are attempting to find out how these proteins interact with each other in fruit flies to help us better understand how the Rad51 helpers function in DNA repair and meiosis. Flies have a protein called spindle-A, which is similar to the mammalian Rad51 protein. Flies also have the putative helper proteins spindle-B, spindle-D, DmRad51D, and DmXRCC2, which are similar to the mammalian proteins XRCC3, Rad51C, Rad51D, and XRCC2 respectively. The proteins spindle-B and spindle-D work in meiosis. We want to find out whether the proteins DmRad51D and DmXRCC2 might also function in meiosis. In our experiment, we will be using a 2-hybrid system to see if the following fly proteins interact: spindle-A and DmXRCC2, spindle-B and DmXRCC2, and spindle-D and DmXRCC2. This might tell us whether DmXRCC2 plays a role in meiosis in fruit flies.

Poster #6

THE DEVELOPMENT OF A KANAMYCIN RESISTANT GENE FOR POSITIVE SELECTION IN THE YEAST *PICHIA PASTORIS*

Matthew Hashimoto, Christopher Hatae, Kimberly Kaya, Geoff & Joan Lin-Cereghino

The yeast *Pichia pastoris* is widely used as a host organism in foreign protein expression, which is a process that is utilized to produce many pharmaceuticals and other industrial products. One of the main problems of *P. pastoris* is that it does not have a wide range of selectable markers available for use in transformation and expression processes. This being the case, the use of *P. pastoris* can be expensive in that one of the few efficient selectable markers on hand is the zeocin resistance gene. Currently only one company, Invitrogen, distributes a commonly used reporter gene, the zeocin resistance gene. Zeocin is an antibiotic that binds to the DNA of a cell (e.g. *P. pastoris*) and cleaves it causing cell death. In this experiment we will attempt to adapt a kanamycin resistance reporter gene to fulfill the same function of the zeocin resistance reporter gene. By creating a new reporter gene using kanamycin resistance the costs of transformation in lab research will drastically be cut. With this new cassette for a reporter gene we hope to open the market for other researchers enabling them to be economically efficient in the lab.

Poster #7

SYNTHESIS OF BIOLOGICALLY ACTIVE TRIPEPTIDE ARG-GLY-ASP (RGD).

Chirag Patel

The short sequence like Arg-Gly-Asp (RGD) is primarily involved in protein binding on cell surfaces. Model studies using RGD and RGD-derived peptide are very important toward understanding the biological function of RGD-containing peptides. However RGD peptides are not easily available commercially. We synthesized the tripeptide RGD using solid-phase peptide synthesis (SPPS). The Wang Resin was used as the solid support. The amino acids Asp, Gly and Arg were coupled to the Wang Resin, respectively. The coupling reagents used were diisoproplycarbodiimide (DIC) and 1-Hydroxybenzotriazole (HOBT). The amino acids used were protected with 9-fluorenylmethyloxycarbonyl (Fmoc) at the N-terminus. This N-terminus protecting group was removed by basic piperidine. An UV-Vis spectrophotometer was used to determine the progress of the deprotection reaction, for fmoc absorbs UV light at 301 nm. Once the entire peptide chain Arg-Gly-Asp was linked to the resin, the peptide was cleaved with Triflouroacetic acid (TFA). The solution obtained was concentrated with a rotovap. Chloroform extraction was performed to remove organic impurities. A crude peptide was obtained by removing the solvent using a centrifuge liked to a vacuum pump. The crude peptide was introduced in a mass spectrometer for MS/MS analysis.

Poster #8

PORTRAIT OF A DESCRIPTIVE PHENOMENOLOGIST: A STYLISTIC APPROACH TO BECKETT

John L. Allen

It seems evident to most readers that Beckett's writing captures and expresses many philosophical dilemmas, both epistemic and ontological. What remains undiscovered is how these complex issues arise through Beckett's use of form. It is the hypothesis of this project that Samuel Beckett employs form in a purposeful way to reinforce content and, further, to impress upon the reader the conflicted state of personal identity as it unfailingly appears to our cognition, reflection, and consciousness. In this project, the form of Beckett's writing has been mapped out in an effort to uncover how specific linguistic deviations sensitize the reader to this predicament. This stylistic approach uses several linguistic modes of analysis, including pragmatics and schema theory. These methods have produced distinct results according to the two genres examined. In Beckett's poem, "the vulture," Beckett establishes this particular effect through deviant syntax, namely the literal and non-literal erasure of the subject. In Beckett's short prose work, "Dante and the Lobster," Beckett establishes the same effect through the speech and thought presentation of the narration.

Poster #9

HABITAT EVALUATION FOR THE CALIFORNIA RED-LEGGED FROG AT LODI LAKE NATURE AREA

Christina Conrardy

The California Red-Legged Frog or *Rana aurora draytonii* is a native frog species of California. As a result of urbanization, cattle grazing, introduction of bullfrogs and other human ecological impacts that lead to the loss of over 70% of *Rana aurora draytonii's* natural habitat, the historic population of the California Red-Legged Frog has declined dramatically. In 1996, *Rana aurora draytonii* was listed as an endangered species. The purpose of this study is to evaluate a potential habitat site for the re-introduction of the California Red-Legged Frog into the Central Valley to permit gene flow between currently existing coastal and Sierra foothill populations. *Rana aurora draytonii* is most often associated with riparian habitat and prefer 0.7 meter deep slow moving water with dense, shrubby emergent vegetation (US Fish and Wildlife 2002). The area of study is Lodi Lake Nature Area. The dataset will include water and soil pH, electrical conductivity, biological oxygen demand, soil particle size, and a general vegetation survey. The date presented will evaluate water quality and if the substrate is adequate for burrowing tadpoles. My hypothesis is that if the ephemeral pond and slough exhibit preferable characteristics of frog breeding habitat, California Red-Legged Frogs could be successfully re-introduced in this area.

Poster #10

PROTEIN PURIFICATION IN FKBP12

Phuong Nguyen and An-Chun Kwan

The objective of our research was to purify human Fkbp12 protein expressed in the yeast *Pichia pastoris*. Purification methods included nickel, cobalt and primary immunoprecipitation where the antigen Fkbp12-anti-myc will bind to the antibody and eluted through centrifugation. The results were detected by SDS-page and Western blot. The results will be display on our poster.

Poster #11

SYNTHESIS AND NMR-ANALYSIS OF 2-AMINO-2-DEOXY-MANNURONIC ACID DERIVATIVES

Katina Sigillo, Tony Chiu, Paul H. Gross, Andreas H. Franz*

Aminosugars constitute abundant building blocks of naturally occurring polysaccharides or antibiotics. The most frequently found aminosugars are members of the class of 2-amino-2-D-hexoses. *N*-Acetyl-D-glucosamine for example is a major constituent of biologically important polysaccharides such as hyaluronic acid and keratan sulfate, and is the anchor for *N*-linked glycans in many glycoproteins. *N*-Acetyl-D-galactosamine can be found in the chondroitin sulfate family, in dermatan sulfate, and as the *O*-glycosidically linked unit in many glycosylated proteins. It has been shown that metabolic pathways of *N*-acetyl-D-glucosamine and *N*-acetyl-D-mannosamine can be exploited for cell surface engineering. Altered cell surface oligosaccharides offer thus a way for the study of cell-cell interactions. For such studies to be meaningful, it is important to have well-characterized simple carbohydrate building blocks and synthetic strategies in hand.

This paper reports the synthesis of 2-amino-2-deoxy derivatives of D-altrose, D-allose, D-glucose, and D-mannose starting from D-glucose. The protected mannosamines were subsequently converted into 2-amino-2-deoxy-mannuronic acids by oxidation. The structures of the products were confirmed by ^{1}H-, ^{13}C-, ^{1}H-^{1}H-COSY, and ^{1}H-^{13}C-COSY (HETCOR) Nuclear Magnetic Resonance (NMR) spectroscopy. Observed coupling constants were correlated with the molecule's average solution conformation by the Karplus equation.

Poster #12

AN ANALYSIS OF THE RNA EXPRESSION PATTERNS OF TWO GENES PREDICTED TO AID IN THE REPAIR OF DNA DAMAGE IN THE FRUIT FLY *DROSOPHILA MELANOGASTER*

Sabrina Jang and Akhil Reddy

Quantitative Real Time PCR is a method for characterizing gene expression patterns and levels amongst several different samples. In our study, we are interested in the expression patterns of DmXRCC2 and DmRad51D in various developmental stages of *Drosophila melanogaster* (fruit flies). Based on homology with human proteins, DmXRCC2 and DmRad51D are thought to help in DNA repair in mitotic cells. However, they are also similar in appearance to other fly genes that help form DNA crossover events in meiosis. By looking at the expression pattern of DmXRCC2 and DmRad51D, we can collect data on whether they are acting in meiosis or mitosis, or both. We will use real-time PCR to examine mRNA levels from collections of embryos, larvae and adult males and females to see when these genes are expressed. By performing real-time PCR on the various stages at the same time with careful controls, we can compare the relative quantities of the genes expressed. This allows us to develop a developmental profile of gene expression for DmXRCC2 and DmRad51D.

Poster #13

ANALYSIS OF SILK GENE EXPRESSION PROFILES IN *LATRODECTUS HESPERUS* FOR MASP1&2

Kristin Kohler, Dr. Craig Vierra

The black widow spider, *Latrodectus hesperus*, has the ability to produce a large variety of different silk types; these silks can be spun in different combinations so that the spider can utilize their distinct mechanical properties for specific functions in the web. Because different silks are secreted and stored in specific glands in the abdomen of the spider, we were interested in establishing which glands were actively transcribing specific silk genes. We previously isolated two silk genes, Major Ampullate Spidroin I (MaSp1) and Major Ampullate Spidroin 2 (MaSp2), which appear to code for proteins that compose dragline silk. To quantify the expression of these genes we dissected various silk glands from numerous black widow spiders to isolate mRNA from the glands. Since varying levels of mRNA generally correspond to varying levels of protein, we then quantified different mRNA levels in the glands by utilizing Real Time Quantitative Polymerase Chain Reaction (RT-QPCR). Using this method, we found high mRNA levels for both MaSp1 and MaSp2 in the major and minor ampullate glands, as well as high levels in the white tubuliform gland. This is significant in that previous publications indicate that silk gene expression is primarily gland specific. Given that expression was found outside of the major ampullate gland, our data indicate that silk gene expression may not be entirely gland specific.

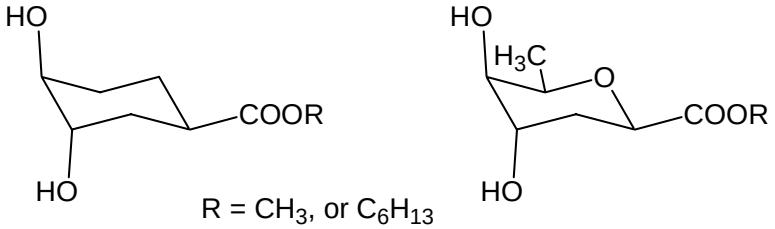
Poster #14

TOTAL SYNTHESIS OF NEW INHIBITORS FOR CARBOHYDRATE-PROCESSING ENZYMES

Sedonia Yoshida, Barbora Brazdova, Vyacheslav Samoshin

C-Glycosides are the chemically and metabolically stable analogs of carbohydrates. They can compete with natural carbohydrates in many biochemical processes. In particular, C-glycosides may interact with enzymes (the biocatalysts that transform carbohydrates) and deactivate (inhibit) them. Therefore, C-glycosides are potential therapeutic agents against many diseases.

We synthesized new potential inhibitors for these enzymes, which formulas are shown below. The series of these compounds will be expanded and tested for the enzyme inhibitory activity.



Poster #15

DEVELOPMENT OF A NEW EXPRESSION PLASMID FOR *PICHIA PASTORIS*

Linda Luong, Will Giang, Jane Vu, Joan Lin-Cereghino, Geoff Lin-Cereghino

Pichia pastoris is a popular yeast strain for heterologous protein expression. The yeast cells can be transformed with exogenous DNA and programmed to express proteins from different sources. For instance, *Pichia pastoris* has been used to express human proteins for medicinal purposes. One advantage of the *P. pastoris* system is that the proteins can be programmed to be secreted out of the cell and into the liquid medium where they grow. This should make purification of the engineered protein easier. Unfortunately, two problems often result. First, the protein often gets caught within the cell and never arrives in the liquid medium. A second problem is if the protein does get secreted outside the cell, it is hard to purify. We have constructed a new plasmid, which allows the heterologous protein to be expressed as a fusion with the maltose binding protein (MBP). We hypothesize that the MBP fusion partner will improve the ability of the cell to secrete a heterologous protein and make its purification much easier. We are currently assessing our data to see if MBP is an effective secretable fusion partner using SDS PAGE and western analysis. If the protein is successfully secreted and purified, it assures us that *P. pastoris* is more useful in laboratory work and the advancement of research

Poster #16

NEW MULTIFUNCTIONAL TAGS FOR OLIGOSACCHARIDES

Soo Jin Chang, Joanne Hsu, Andreas H. Franz*

Carbohydrates play central roles in many cellular processes, and structure-activity studies of carbohydrates begin to receive increasing attention. Solutions to complications during cleanup, separation, and structural characterization of oligosaccharides (OS) have been described in the literature. (a) Partial cleanup of biotin-labeled OS-mixtures prior to chromatography can be accomplished by bioaffinity technology; (b) various UV-active tags can overcome limitations due to the general lack of chromophoric groups in sugars; (c) mass spectrometry and MS^n-techniques take a central role in the structural elucidation of OS. In this paper, we present newly-synthesized tags that combine UV-activity, bioaffinity, and ease of chemical introduction into oligosaccharides along with the possibility for isotope-coding and for *N*-quaternization. The synthesis of the tags, their structural characterization, and the labeling of oligosaccharides is discussed.

The tags were synthesized by carbonyl diimidazole coupling of biotin and two benzylic diamines. Oligosaccharides were derivatized with the tags by reductive amination in the presence of $NaCNBH_3$ (or $NaCNBD_3$) and glacial acetic acid. *N*-Quaternization was carried out in the presence of MeI and $NaHCO_3$. The products were purified by solid-phase extraction (SPE). Electrospray ionization mass spectra and collision-induced dissociation spectra were recorded as well as time-of-flight mass spectra and post-source decay spectra to confirm the identity of the derivatives.

Poster #17

DEVELOPMENT OF INTERNAL STANDARDS FOR QUANTIATIVE PCR BY SUBCLONING

Tam Hoang

DNA adducts are covalent modifications to DNA strands that includes strand breaking, cross linking and chemical modification (oxidation, alkylation, etc.) which presumably leads to mutations and eventually cancer. The presence of DNA adducts has been used as a biomarker in biological systems for DNA damage that may eventually result in unrestricted cell growth. Polymerase Chain Reaction (PCR) can be used as an assay to demonstrate the DNA damage caused by carcinogenic compounds such as cisplatin and benzopyrene by inhibition of a target PCR product due to presence of DNA adducts. We have shown previously that a simple PCR assay can be used to amplify a fragment of the p53 gene (tumor suppressor gene) and can detect reduction in DNA damage when genistein and quercetin (chemical compounds found naturally in plants) are present to inhibit formation of adducts in DNA. In order to quantitate the amounts of DNA inhibition, competitive PCR must be used. Absolute quantitation, using competitive RT-PCR, measures the absolute amount (e.g., 5.3×10^5 copies) of a specific mRNA sequence in a sample. Dilutions of a synthetic DNA sequence (identical in sequence, but slightly shorter than the endogenous target) are added to the sample DNA which replicates and are co-amplified with the endogenous target. The PCR product from the endogenous transcript is then compared to the concentration curve created by the synthetic "competitor DNA." The synthetic DNA sequence is essentially an internal standard by which we can compare PCR amplification results to. In this project we subcloned a 1057 bp fragment of the p53 gene into the pUC 19 vector. The p53 fragment was isolated from the PHP53B clone (ATCC 57254) using restriction sites for the endonuclease Ban II. Next we will ubsert a 90 bp fragment of the human Ha-ras gene into the p53 gene sequence at a unique Nco I endonuclease site. The Ha-ras gene will be isolated from total human DNA using PCR or from ATCC clone 41028 with primers containing NcoI sites. A small amount of the this internal standard will be added to future experiments amplifying the p53 gene after being reacted with varying concentrations of carcinogenic compounds (i.e. cisplatin, benzopyrene) versus incubation with anti-adducting compounds such as genistein and quercetin. This will allow us to determine how much of the original DNA was intact.

Poster #18

CREATING A MICROSATELLITE LIBRARY FOR THE STUDY OF PLANTS IN THE GENUS *MONARDELLA*

Josephine Ng and Carrie Meusburger

The Lamiaceae family is comprised of over thirty rare species of plants, including the dune-dwelling *Monardella crispa* and the inland-growing *M. frutescens* and *M. undulata.* The phenotypic differences of these three species bring into question whether these plants are genetically identical or if they are, in fact, three completely distinct species. An analysis of microsatellite-containing regions from *Monardella* will help us address this question. Microsatellites are regions of DNA that contain short tandem repeats of two nucleotides, like CA or CT. The size of these repeats can vary dramatically from individual to individual, and can be used to provide DNA fingerprints of individual plants to tell them apart from one another or from different species. We are in the process of constructing a *Monardella crispa* microsatellite library, which involves extraction of DNA from plant tissues, cloning small fragments of plant DNA into plasmids, and screening the clones for those that contain microsatellite DNA. Microsatellite regions can be rare or difficult to detect in plants, but once obtained we will generate the DNA sequences of these clones using an ABI 310 Genetic Analyzer. Once the microsatellite sequences are obtained, the numbers and lengths of the short tandem repeats can be used for future comparison between *M. frutescens* and *M. undulata* to identify whether these species are genetically different, or whether they are genetically identical and differ physically due to environmental conditions.

Poster #19

PERCEPTIONS OF RAPE: THE ROLES OF GENDER AND VICTIM/PERPETRATOR RELATIONSHIP

C. Traci Craven

Though rape can occur in a variety of relationships, its effects are sometimes minimized depending upon the victim/perpetrator relationship and the gender of the person assessing the situation. In 2000, Monson, Langhrichsen-Rohling and Binderup found that participants were less critical of a fictitious rape that occurred between a married couple than between a dating couple. In addition, Simonson and Subich (1999) determined that females were less likely than males to minimize a fictional rape. In the present study, participants read a vignette that portrayed a heterosexual rape that occurred between a couple that was dating, married, or acquainted (in each vignette the aggressor was male) and their perception of the violation was then measured on a Likert-scale questionnaire. Also, the participants selected the term, from five options, that they believed best characterized the aggression. The results indicated that females were significantly more likely than males to rate the perpetrators' behavior as aggressive. In addition, females used the term *rape* to describe the violation that occurred in the marriage vignette less often than they did in other vignettes. This finding may have important implications in the design of future rape prevention programs.

Poster #20

PAN2MIME

Janet Nguyen, Denise Bohannon, Marina Borroel, Alexis Bruemmer, Cherilyn Faylogna, Huong Nguyen, Minh-Tu Vo, Laurie Wallace, See Yang, Debbie McCaffrey

History: Pre-visualization, "Pre-Viz", is a technique used in the motion picture industry to emulate camera movement, lens angles, and character movements as a computer animation before a single frame of film has been shot. Even though it saves thousands in potential production cost, the current methods of pre-visualization are cumbersome and very labor-intensive.

Even with its awkward implementation, pre-visualization is still widely used and will soon receive high publicity with the release of the new film *Polar Express*. Director Robert Zemeckis has merged the world of live action directing and pre-visualization. The publicity on this new technology that will follow the release of this movie makes it a good time for both the University of the Pacific and SWE to be involved with this project.

Objective: The objective of this project is to create a full pre-visualization system centered around the Maya® platform. Alias System's Maya® software, well known as an industry standard, lets a user create digital imagery, 3D animation and visual effects. The system we will develop, code named ***pan2mime***, will have three major components spanning four engineering disciplines: mechanical, electrical, computer science, and computer engineering. The pre-visualization system will replace the cumbersome user interface that now exists with more intuitive input devices, making it much easier for a director to use as well as providing quicker turn-around time.

Poster #21

COMPUTER VISION PARAMETER ASSESSMENT FOR GENERIC OBJECT RECOGNITION

Marina Borroel, Huong Nguyen, Melanie A. Sutton, and Louise Stark

Research in computer vision is aimed at making meaningful decisions about scenes of the physical world, based on analyzing images. Segmentation strategies for understanding scenes are one critical step in this process. Scene segmentation is simply the process of attaching symbolic labels to the significant areas in the image of the scene. The particular avenue explored here is based on a novel approach of autonomously directing image acquisition and subsequent segmentation by determining the extent to which surfaces in the scene meet specified functional requirements for generic categories of objects.

Results are provided for real data derived from a stereo camera system, the Small Vision System stereo processing software, and the Generic Recognition Using Form and Function object recognition system.

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