Paper Title*

*Note: Sub-titles are not captured in Xplore and should not be used

1st Carlos Enrique Tisza Vargas
dept. name of organization (of Aff.)
Ricardo Palma (of Aff.)
Lima, Peru
ctiszav@gmail.com

***Abstract*—el presente trabajo compila el resultado del estudio de 10 paper relacionados con los temas de clasificacion multilabel multimodal sobre publicaciones del portal ACM. En la actualidad hay una busqueda de nuevos metodos o combinacion de metodos existentes para mejorar los procesos de clasificacion de variables , Uno de los pilares sobre los cuales estan basados los paper es en incrementar el ratio de clasificacion utilizando muchas fuentes de datos.**

***Index Terms*—component, formatting, style, styling, insert**

I. Introduction

En el mundo real generalmente la representación de objetos que se desean analizar se componen de multiples etiquetas y se pueden representar con multiples representaciones modales.

Por ejemplo los articulos suelen tener texto e imagenes otro ejemplo seria de el historial de datos de un usuario en forma de registros el cual se analiza con la finalidad de generar un perfil a este se le podria adicionar grabaciones de audios y videos con la finalidad de mejorar la predicción.

Los Sistemas de recomendación híbrido atacan el problema de analizar multiple fuentes de datos con multiple etiquetas

Procesar grandes cantidades de información y clasificarlas es un problema

Debido a la cantidad de poder de calculo que se necesita para procesar enormes bases de datos, es por eso que es necesario desaroollar tecnicas para optimizar los procesos de clasificación. aun mas cuando los procesos requieren clasificaciones en tiempo real .

Se han realizado esfuerzos para mejorar la eficacia del aprendizaje multi-etiqueta con etiquetas incompletas. Actualmente la mayoria de técnicas para el asumen que las características de los datos de entrada estan completas.

En el mundo real los datos con etiquetas incompletas son comunes y la co-ocurrencia de caracteristicas altamente incompletas y de asignaciones de etiquetas débiles es un desafío dado que los algoritmos de multietiqueta no son directamente aplicables.

II. Sistemas de recomendación híbridos

A. Descripción del problema

La tienda online ASOS atrajo 174 de millones de visitantes durante diciembre de 2017 y tiene 16 millomnes de clientes activos. En todo momento tiene 85K de productos activos y aproximadamente 5k de nuevos productos entran a la tienda cada semana. a traves de los anos diferentes divisiones de la compania producen y consumen diferentes atributos de los productos algunos no se muestran al cliente final por lo tanto no estan completos y no son consistentes.

TABLE I
Representación de los atributos de los productos

producto	tipo	segmento	patron	...
A	dress	?	floral	?
B	dress	girly girl	?	...
C	skirt	?	check	?
...	...	...	...	...

En este trabajo se muestra como se ha realizado una caracterizacion de un cojunto de atributos de productos y como se habilita la personalizacion de la expereiencia de un cliente mostrandole lo mas relevante para el.

B. Diseño

1) Clasificación de imagenes: La moda es un dominio muy visual y con la popularidad del aprendizaje profundo ya existe en la literatura bastantes enfoques para clasificar y predecir los atributos de ropa a partir de la imagen. para este caso se aplicó la red neuronal convolucional VGG16 con datos entrenados de ImageNet

2) Clasificación de Texto: Las redes neuronales convolucionales han demostrado tambien ser efectivas en clasificar no solo imágenes sino también texto. Las oraciones se pueden tratar como secuencias de palabras, donde Cada palabra a su vez puede representarse como un vector en un *multidimensional word embedding space*.

3) Multi-modal Fusion: Cada modelidad es procesada en diferentes redes, despues de llegar a un nivel las resultados son concatenados siguiendo capas multimodales , la politica de la red esta aprendiendo a decidir que clasificador utilizara.

En la figura 1 [1] se muestra la arquitectura de una red de fusión multi-modal.

4) Multi-Task learning with Missing Labels: Los datos de entrenamiento requerirían implementar una función de pérdida personalizada o enmascarar capas para evitar propagar errores cuando una etiqueta no está disponible.

Identify applicable funding agency here. If none, delete this.

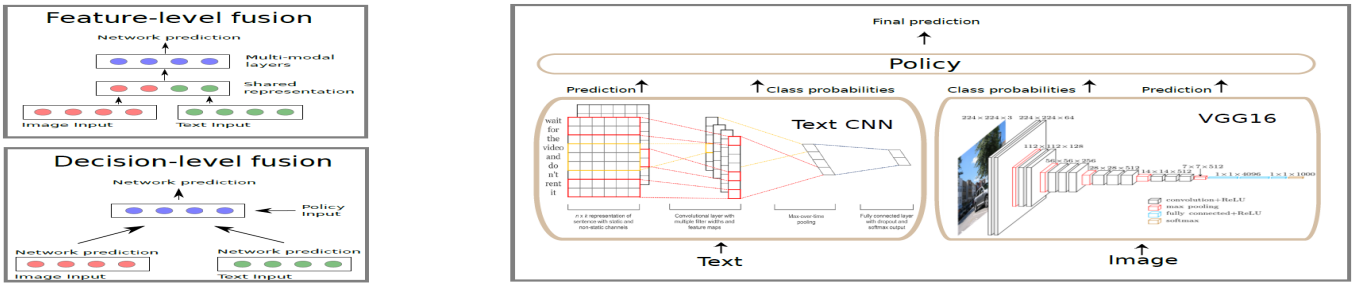

Fig. 1. Multimodal Fusión

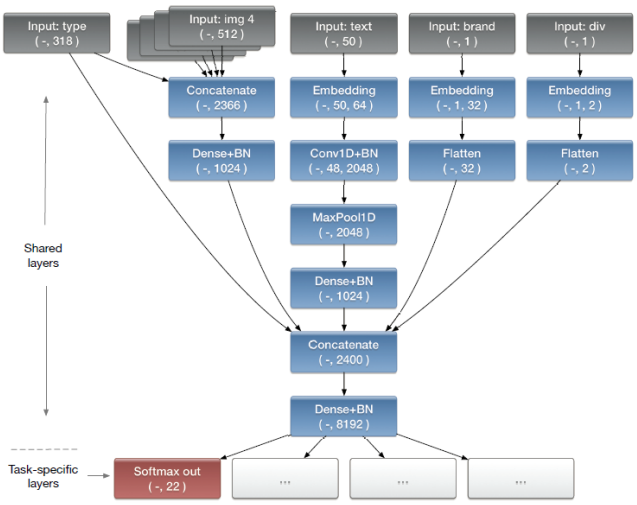

Fig. 2. Multi-modal multi-task architecture

Se implementó la arquitectura mostrada en la figura 4, aquí los cuadros de color gris representan las entradas a la red , entre parentesis se muestran el tamaño de la salida de cada red , en azul las capas ocultas y rojo las capas de salidad .

en la practica como se ilustra en la figura se contruye un modelo para cada atributo pero todos comparten los mismos parámetros hasta laa capa de salida. Tambien se prepapa un conjunto de datos para cada atributo , los cuales son actualizados mediante el enjoque de descenso de gradiente(SGD) durante el entrenamiento .

C. Resultados

La tabla 2 muestra los resultados de los experimentos de recomendanciones , promedios y desviaciones estandares despues de 10 ejecuciones . Se observa que el modelo hibrido es el mas efectivo comparado con otras aproximaciones como filtrado colaborativo .

III. A Multi-Modal Multi-Instance Multi-Label Deep Network with Optimal Transport

Este trabajo el objetivo es predecir y explorar la correlacción de las etiquetas simultaneamente. se propuso usar la red M3DN (modelo Multi-modal Multi-instancia Multietiqueta)

TABLE II
Resultados

	prec@10	recall@10
Popularity	0.00231	0.00765
Collaborative	0.00277±0.00011	0.00931±0.00036
Content	0.00246±0.00011	0.00755±0.00191
Hybrid	0.00313±0.00015	0.00960±0.00252

que modela las redes independientes para cada modalidad e impone la consitencia en el bag level que se utiliza para la predicción de diferentes modalidades que tienen etiquetas correlacionadas

Se denomina bag a cada muestra la cual esta representada por varias instancias

Se tiene N bags los cuales pueden ser positivos o negativos , además cada bag tiene k modalidades las cuales tienen un conjunto de instancias que son los datos de entrenamiento.

A. Transporte óptimo

el transporte optimo se define como la distancia minima que existe entre dos distribuciones.

B. Multi-Modal Multi-instance Multi-label Deep Network (M3DN)

En la figura 3 se muestra las dos modalidades , el bag de 4 imagenes y el bag de 5 parrafos de texto. En base a la teoria del transporte optimo, M3DN adopta la distancia ooptima de transporte para medir la ccalidad de la prediccion que captura la informacion geolmetrica del esllpacio de la etiqueta subyacente .

ademas M3DN automaticamente aoprende de la correlacion entre las etiquetas de las diferentes modalidades. M3DN automaticamente aprenden los predictores de las diferentes modalidades .

C. Resutados

Comparación de los resultados (mean+std) de M3DM sobre los datos de WKG Game-Hub.

D. Exploración de Correlación de etiquetas

Teniendo en cuenta que M3DN puede aprender la correlación de la etiqueta explícitamente. En esta subsección, examinamos la efectividad de M3DN.

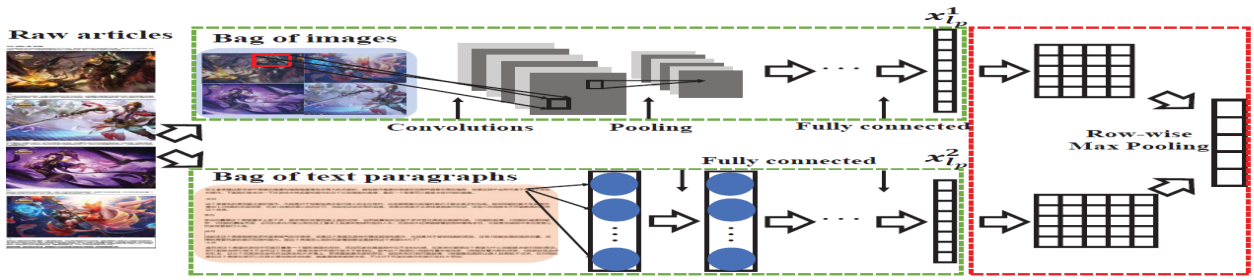

Fig. 3. Multimodal Fusión

Methods	Coverage ↓ ($\times 10^3$)	Macro AUC ↑	Ranking Loss ↓	Example AUC ↑	Average Precision ↑	Micro AUC ↑
M3LDA	1.645±.056	.519±.005	.921±.004	.320±.007	.062±.004	.307±.005
MIMLmix	1.472±.118	.502±.030	.442±.008	.578±.008	.028±.013	.502±.030
CS3G	.424±.017	.550±.018	.364±.017	.651±.017	.241±.020	.619±.015
DeepMIML	.932±.025	.607±.010	.217±.003	.791±.002	.123±.007	.814±.003
M3MIML	N/A	N/A	N/A	N/A	N/A	N/A
MIMLfast	1.239±.072	.509±.024	.297±.022	.703±.022	.128±.019	.711±.027
SLEEC	1.603±.013	.506±.012	.855±.007	.393±.005	.050±.006	.381±.006
Tram	.902±.017	.499±.008	.115±.019	.354±.021	.064±.008	.064±.008
ECC	1.602±.020	.530±.004	.838±.019	.403±.015	.098±.005	.395±.011
ML-KNN	.873±.002	.613±.002	.195±.003	.805±.003	.156±.001	.828±.001
RankSVM	N/A	N/A	N/A	N/A	N/A	N/A
ML-SVM	.949±.029	.471±.006	.228±.010	.783±.008	.131±.003	.803±.007
M3DN	**.311±.032**	**.693±.005**	**.155±.018**	**.840±.018**	**.307±.001**	**.868±.013**

Fig. 4. Resultados

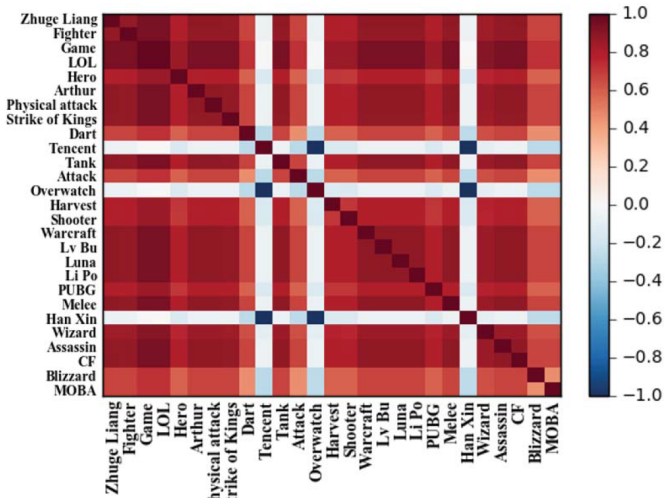

Fig. 5. Multi-modal multi-task architecture

La exploración se lleva a cabo en el conjunto de datos real de WKG Game-Hug. Muestreamos aleatoriamente 27 etiquetas, y la métrica del terreno aprendida por M3DN se muestra en la Figura 4, y escalamos el valor original en la matriz de costos en [-1, 1]. rojo color indica una correlación positiva, y azul indica una correlación negativa.

IV. Prepare Your Paper Before Styling

Before you begin to format your paper, first write and save the content as a separate text file. Complete all content and organizational editing before formatting. Please note sections IV-A–IV-E below for more information on proofreading, spelling and grammar.

Keep your text and graphic files separate until after the text has been formatted and styled. Do not number text heads—LaTeX will do that for you.

A. Abbreviations and Acronyms

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, ac, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

B. Units

- Use either SI (MKS) or CGS as primary units. (SI units are encouraged.) English units may be used as secondary units (in parentheses). An exception would be the use of English units as identifiers in trade, such as “3.5-inch disk drive”.
- Avoid combining SI and CGS units, such as current in amperes and magnetic field in oersteds. This often leads to confusion because equations do not balance dimensionally. If you must use mixed units, clearly state the units for each quantity that you use in an equation.
- Do not mix complete spellings and abbreviations of units: “Wb/m^2” or “webers per square meter”, not “webers/m^2”. Spell out units when they appear in text: “. . . a few henries”, not “. . . a few H”.
- Use a zero before decimal points: “0.25”, not “.25”. Use “cm^3”, not “cc”.)

C. Equations

Number equations consecutively. To make your equations more compact, you may use the solidus (/), the exp function, or appropriate exponents. Italicize Roman symbols for quantities and variables, but not Greek symbols. Use a long dash rather than a hyphen for a minus sign. Punctuate equations with commas or periods when they are part of a sentence, as in:

$$a + b = \gamma \tag{1}$$

Be sure that the symbols in your equation have been defined before or immediately following the equation. Use "(1)", not "Eq. (1)" or "equation (1)", except at the beginning of a sentence: "Equation (1) is . . ."

D. LaTeX-Specific Advice

Please use "soft" (e.g., `\eqref{Eq}`) cross references instead of "hard" references (e.g., `(1)`). That will make it possible to combine sections, add equations, or change the order of figures or citations without having to go through the file line by line.

Please don't use the `{eqnarray}` equation environment. Use `{align}` or `{IEEEeqnarray}` instead. The `{eqnarray}` environment leaves unsightly spaces around relation symbols.

Please note that the `{subequations}` environment in LaTeX will increment the main equation counter even when there are no equation numbers displayed. If you forget that, you might write an article in which the equation numbers skip from (17) to (20), causing the copy editors to wonder if you've discovered a new method of counting.

BibTeX does not work by magic. It doesn't get the bibliographic data from thin air but from .bib files. If you use BibTeX to produce a bibliography you must send the .bib files.

LaTeX can't read your mind. If you assign the same label to a subsubsection and a table, you might find that Table I has been cross referenced as Table IV-B3.

LaTeX does not have precognitive abilities. If you put a `\label` command before the command that updates the counter it's supposed to be using, the label will pick up the last counter to be cross referenced instead. In particular, a `\label` command should not go before the caption of a figure or a table.

Do not use `\nonumber` inside the `{array}` environment. It will not stop equation numbers inside `{array}` (there won't be any anyway) and it might stop a wanted equation number in the surrounding equation.

E. Some Common Mistakes

- The word "data" is plural, not singular.
- The subscript for the permeability of vacuum μ_0, and other common scientific constants, is zero with subscript formatting, not a lowercase letter "o".
- In American English, commas, semicolons, periods, question and exclamation marks are located within quotation marks only when a complete thought or name is cited, such as a title or full quotation. When quotation marks are used, instead of a bold or italic typeface, to highlight a word or phrase, punctuation should appear outside of the quotation marks. A parenthetical phrase or statement at the end of a sentence is punctuated outside of the closing parenthesis (like this). (A parenthetical sentence is punctuated within the parentheses.)
- A graph within a graph is an "inset", not an "insert". The word alternatively is preferred to the word "alternately" (unless you really mean something that alternates).
- Do not use the word "essentially" to mean "approximately" or "effectively".
- In your paper title, if the words "that uses" can accurately replace the word "using", capitalize the "u"; if not, keep using lower-cased.
- Be aware of the different meanings of the homophones "affect" and "effect", "complement" and "compliment", "discreet" and "discrete", "principal" and "principle".
- Do not confuse "imply" and "infer".
- The prefix "non" is not a word; it should be joined to the word it modifies, usually without a hyphen.
- There is no period after the "et" in the Latin abbreviation "et al.".
- The abbreviation "i.e." means "that is", and the abbreviation "e.g." means "for example".

An excellent style manual for science writers is [7].

F. Authors and Affiliations

The class file is designed for, but not limited to, six authors. A minimum of one author is required for all conference articles. Author names should be listed starting from left to right and then moving down to the next line. This is the author sequence that will be used in future citations and by indexing services. Names should not be listed in columns nor group by affiliation. Please keep your affiliations as succinct as possible (for example, do not differentiate among departments of the same organization).

G. Identify the Headings

Headings, or heads, are organizational devices that guide the reader through your paper. There are two types: component heads and text heads.

Component heads identify the different components of your paper and are not topically subordinate to each other. Examples include Acknowledgments and References and, for these, the correct style to use is "Heading 5". Use "figure caption" for your Figure captions, and "table head" for your table title. Run-in heads, such as "Abstract", will require you to apply a style (in this case, italic) in addition to the style provided by the drop down menu to differentiate the head from the text.

Text heads organize the topics on a relational, hierarchical basis. For example, the paper title is the primary text head because all subsequent material relates and elaborates on this one topic. If there are two or more sub-topics, the next level head (uppercase Roman numerals) should be used and,

conversely, if there are not at least two sub-topics, then no subheads should be introduced.

H. Figures and Tables

a) Positioning Figures and Tables: Place figures and tables at the top and bottom of columns. Avoid placing them in the middle of columns. Large figures and tables may span across both columns. Figure captions should be below the figures; table heads should appear above the tables. Insert figures and tables after they are cited in the text. Use the abbreviation "Fig. 6", even at the beginning of a sentence.

TABLE III
TABLE TYPE STYLES

Table Head	Table Column Head		
	Table column subhead	*Subhead*	*Subhead*
copy	More table copy[a]		

[a]Sample of a Table footnote.

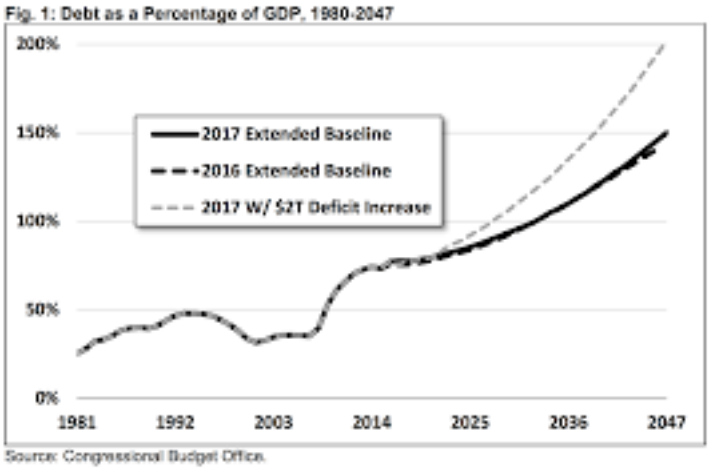

Fig. 6. Example of a figure caption.

Figure Labels: Use 8 point Times New Roman for Figure labels. Use words rather than symbols or abbreviations when writing Figure axis labels to avoid confusing the reader. As an example, write the quantity "Magnetization", or "Magnetization, M", not just "M". If including units in the label, present them within parentheses. Do not label axes only with units. In the example, write "Magnetization (A/m)" or "Magnetization {A[m(1)]}", not just "A/m". Do not label axes with a ratio of quantities and units. For example, write "Temperature (K)", not "Temperature/K".

ACKNOWLEDGMENT

The preferred spelling of the word "acknowledgment" in America is without an "e" after the "g". Avoid the stilted expression "one of us (R. B. G.) thanks ...". Instead, try "R. B. G. thanks...". Put sponsor acknowledgments in the unnumbered footnote on the first page.

REFERENCES

Please number citations consecutively within brackets [1]. The sentence punctuation follows the bracket [2]. Refer simply to the reference number, as in [3]—do not use "Ref. [3]" or "reference [3]" except at the beginning of a sentence: "Reference [3] was the first ..."

Number footnotes separately in superscripts. Place the actual footnote at the bottom of the column in which it was cited. Do not put footnotes in the abstract or reference list. Use letters for table footnotes.

Unless there are six authors or more give all authors' names; do not use "et al.". Papers that have not been published, even if they have been submitted for publication, should be cited as "unpublished" [4]. Papers that have been accepted for publication should be cited as "in press" [5]. Capitalize only the first word in a paper title, except for proper nouns and element symbols.

For papers published in translation journals, please give the English citation first, followed by the original foreign-language citation [6].

REFERENCES

[1] Tom Zahavy, Alessandro Magnani, Abhinandan Krishnan, and Shie Mannor. 2016. Is a picture worth a thousand words? A Deep Multi-Modal Fusion Architecture for Product Classification in e-commerce. arXiv preprint arXiv:1611.09534 (2016).
[2] J. Clerk Maxwell, A Treatise on Electricity and Magnetism, 3rd ed., vol. 2. Oxford: Clarendon, 1892, pp.68–73.
[3] I. S. Jacobs and C. P. Bean, "Fine particles, thin films and exchange anisotropy," in Magnetism, vol. III, G. T. Rado and H. Suhl, Eds. New York: Academic, 1963, pp. 271–350.
[4] K. Elissa, "Title of paper if known," unpublished.
[5] R. Nicole, "Title of paper with only first word capitalized," J. Name Stand. Abbrev., in press.
[6] Y. Yorozu, M. Hirano, K. Oka, and Y. Tagawa, "Electron spectroscopy studies on magneto-optical media and plastic substrate interface," IEEE Transl. J. Magn. Japan, vol. 2, pp. 740–741, August 1987 [Digests 9th Annual Conf. Magnetics Japan, p. 301, 1982].
[7] M. Young, The Technical Writer's Handbook. Mill Valley, CA: University Science, 1989.