

Supplementary Materials for Markov Determinantal Point Processes

1 Further Preference Learning Results

As described in the paper, we generated 10 articles per day for 100 days to illustrate how the different methods balance between exploring the space of all 1427 articles to discover the 200 preselected articles (*recall*) and exploiting the learned set of features to keep showing preferred articles (*precision*).

For a single trial, Figure 1 shows the fraction of articles displayed to the user at each time step that are in the preselected pool.

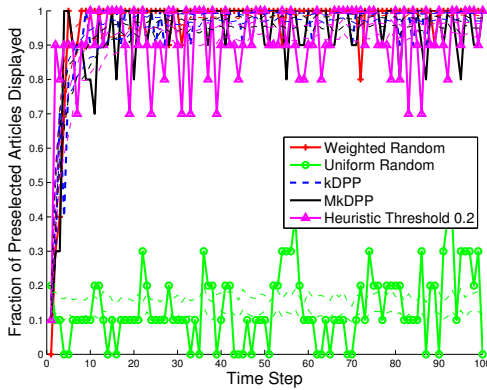


Figure 1: The fraction of preferred articles displayed to user at each time step for a single trial.

Figure 2 shows the headlines of the articles shown on days 99 and 100 by all four methods during a single randomly selected trial. Yellow highlighting indicates the article headlines that are in the preselected pool of preferred articles, while the red borders indicate articles that appear on two consecutive days.

We observe that weighted random sampling has high precision, with all articles displayed in both days coming from the preselected pool. Notice, however, that five articles are repeated within the the two days. Compare this with uniform sampling, which did not display any articles twice in the two days, but only manages to display two preselected articles each day. The k DPP has high precision, but again suffers from a similar repeating of articles as seen in the weighted random sampling. The M - k DPP on the other hand does a better job overall, having a high precision for the two days without any repeat articles. Table 1 shows the marginal diversity and the between-step diversity on those two days. We observe M - k DPP chooses more diverse articles compared to the k DPP and weighted random sampling.

ENERGY INDUSTRY MAY STILL BE WORTH TAPPING INTO	ENERGY INDUSTRY MAY STILL BE WORTH TAPPING INTO
NEW OIL INVESTORS MAY BRING MORE VOLATILE PRICES	NEW OIL INVESTORS MAY BRING MORE VOLATILE PRICES
OPEC STRIVES TO REGAIN CLOUT BY ADDING CAPACITY	OPEC STRIVES TO REGAIN CLOUT BY ADDING CAPACITY
BOND INVESTORS FACE RATE THREAT	BOND INVESTORS FACE RATE THREAT
RUNNING WITH THE BULLS	RUNNING WITH THE BULLS
RELEASE OF FED MINUTES HURTS MARKET	GLOBAL MARKETS POISED TO EXTEND THEIR GAINS
BEHIND THE BOUNCING BALL OF OIL PRICES	FOR COMMODITIES, HOPE IS RISING
EDITORIAL: THE SAUDI SYNDROME	FED NOTES DISCLOSE WORRIES THAT INFLATION MAY PICK UP
A RETURN TO NORMAL	LET'S PLAY HEDGE FUND
KC-BLOCK-BUSINESS	EMPLOYERS ADD 157,000 JOBS IN DECEMBER

(a) Weighted random sampling

ADVANCE FOR SUNDAY, JAN. 9 CORPORATE GADFLY PAYS STEEP PRICE TO SEEK JUSTICE	NO 'SMOKING GUN' IN THE INQUIRY INTO IRAQ'S PREWAR OIL SALES
GENZYME PUTS ITS MONEY ON CANCER DRUGS	BRISTOL-MYERS SEEKS TO SELL EXCEDRIN LINE
KC-GARMIN -- BUSINESS	2 SHOWS OFFER FEAST OF VISUALS FROM FAR EAST
'TOO MUCH LIGHT MAKES THE BABY GO BLIND': DON'T BLINK, YOU MAY MISS THE SHOW	CHANGE OF COURSE IN HOUSE ETHICS RULE MEANS DELAY WOULD LOSE LEADERSHIP POST IF INDICTED BY TEXAS GRAND JURY
1-3-05 WINTER TIME TO PLAN, PRUNE, AND EVEN PLANT	CUPID COMES CALLING 65 YEARS LATER COUPLE REKINDLES ROMANCE DECADES AFTER THEIR FIRST AND ONLY DATE
AMERICANS LET THEIR TASTE TROT THE GLOBE	SHIRLEY CHISHOLM, 80, FIRST BLACK CONGRESSWOMAN
IRAQ WAR PUSHES U.S. NATIONAL GUARD INTO NEW ROLES	IN DICK CLARK'S ABSENCE, OTHERS FILL THE VACUUM
CDC SENDS CREW TO HELP AFTER QUAKE	HILLS OF TENNESSEE TOUGH PLACE TO TAKE A WHIZZER
'THE WILL': ONE AGING RICH GUY, 10 HEIRS, MACHINATIONS AND PLASTIC SURGERY	TRIAL BEGINS FOR SIX MEN ACCUSED OF PLOTTING TO BOMB U.S. EMBASSY
USC MOVING TOWARD A DYNASTY	SHARED IN SRI LANKA

(b) Uniform random sampling

NEW OIL INVESTORS MAY BRING MORE VOLATILE PRICES	NEW OIL INVESTORS MAY BRING MORE VOLATILE PRICES
GLOBAL MARKETS POISED TO EXTEND THEIR GAINS	GLOBAL MARKETS POISED TO EXTEND THEIR GAINS
OPEC STRIVES TO REGAIN CLOUT BY ADDING CAPACITY	OPEC STRIVES TO REGAIN CLOUT BY ADDING CAPACITY
ECONOMY ADDED 157,000 JOBS IN DECEMBER	IN NATURAL RESOURCES FUNDS, HOW LONG WILL THE BATTERIES LAST?
RUNNING WITH THE BULLS	A RETURN TO NORMAL
ENERGY INDUSTRY MAY STILL BE WORTH TAPPING INTO	KC-BLOCK-BUSINESS
DRUBBING OF THE DOLLAR: DANGEROUS OR THERAPEUTIC?	CHINESE AUTOMAKER'S PLAN TO SELL CARS IN U.S. FACES HURDLES
SUGHED: GET READY FOR HIGHER HOME INSURANCE BILLS	FED NOTES DISCLOSE WORRIES THAT INFLATION MAY PICK UP
FOR COMMODITIES, HOPE IS RISING	BOND INVESTORS FACE RATE THREAT
EDITORIAL: TROUBLE IN THE FORESTS	AS GEOPOLITICS TAKES HOLD, CHEAP OIL RECEDES INTO PAST

(c) k DPP

MARKET WORRIES ARE WANING, ANALYSTS SAY	FED NOTES DISCLOSE WORRIES THAT INFLATION MAY PICK UP
A RETURN TO NORMAL	EDITORIAL--THE SAUDI SYNDROME
EMPLOYERS ADD 157,000 JOBS IN DECEMBER	FOR COMMODITIES, HOPE IS RISING
ONLINE EXIT INTERVIEWS REVEAL MORE HONESTY	IN NATURAL RESOURCES FUNDS, HOW LONG WILL THE BATTERIES LAST?
ENERGY INDUSTRY MAY STILL BE WORTH TAPPING INTO	NEW OIL INVESTORS MAY BRING MORE VOLATILE PRICES
MARKET PLACE: CASH FLOW IN '04 FOUND ITS WAY INTO DIVIDENDS	ECONOMY ADDED 157,000 JOBS IN DECEMBER
NETWORK -- COLUMN INTEREST RATES EXPECTED TO RISE	ARCHIPELAGO MAKES BID FOR PACIFIC EXCHANGE
RUNNING WITH THE BULLS	LET'S PLAY HEDGE FUND
U.S. IS FACING A CHOICE AND AN OPPORTUNITY AT AID TALKS IN JAKARTA	OPEC STRIVES TO REGAIN CLOUT BY ADDING CAPACITY
FUNDS LEARN TO GAUGE THE DOLLAR	ECONOMIC VIEW: BEHIND THE BOUNCING BALL OF OIL PRICES

(d) M - k DPP

Figure 2: Headlines selected on days 99 (left) and 100 (right). Yellow highlighting indicate articles from the pre-selected pool of preferred articles and red boxes outline repeated articles chosen on both days.

Method	Avg. marginal diversity	Between-step diversity
M - k DPP	0.766	0.738
k -DPP	0.753	0.512
Weighted Rand.	0.716	0.362
Uniform Rand.	0.975	0.964

Table 1: Diversity of the articles chosen on days 99 and 100.