

Supplementary Material

This appendix provides examples from the test set, with side-by-side comparisons of the reference summaries and the summaries produced by our models. In each example:

- *italics* denote out-of-vocabulary words
- **red** denotes factual errors in the summaries
- **green shading** intensity represents the value of the generation probability p_{gen}
- **yellow shading** intensity represents final value of the coverage vector at the end of final model's summarization process.

Article (truncated): andy murray came close to giving himself some extra preparation time for his wedding next week before ensuring that he still has unfinished tennis business to attend to . the world no 4 is into the semi-finals of the miami open , but not before getting a scare from 21 year-old austrian dominic *thiem* , who pushed him to 4-4 in the second set before going down 3-6 6-4 , 6-1 in an hour and three quarters . murray was awaiting the winner from the last eight match between tomas berdych and argentina 's juan monaco . prior to this tournament *thiem* lost in the second round of a challenger event to soon-to-be new brit *aljaz* bedene . andy murray pumps his first after defeating dominic *thiem* to reach the miami open semi finals . *murray* throws his *sweatband* into the crowd after completing a 3-6 , 6-4 , 6-1 victory in florida . murray shakes hands with *thiem* who he described as a ' strong guy ' after the game . and murray has a fairly simple message for any of his fellow british tennis players who might be agitated about his imminent arrival into the home ranks : do n't complain . instead the british no 1 believes his colleagues should use the assimilation of the world number 83 , originally from slovenia , as motivation to better themselves .

Reference Summary:

british no 1 defeated dominic *thiem* in miami open quarter finals .
andy murray celebrated his 500th career win in the previous round .
third seed will play the winner of tomas berdych and juan monaco in the semi finals of the atp masters 1000 event in key biscayne .

Baseline:

andy murray beat UNK **bedene 6-3** , 6-4 , 6-1 in an hour and three quarters .
british no 1 believes his colleagues should use the **maze** of the world number 83 , originally from slovenia , as motivation to better themselves .

Pointer-Generator, No Coverage:

andy murray came close to giving himself some extra preparation for his wedding next week before getting a scare from 21 year-old austrian dominic *thiem* .
the world no 4 is into the semi-finals of the miami open , but not before getting a scare from 21 year-old austrian dominic *thiem* .

Pointer-Generator, With Coverage:

andy murray defeated dominic *thiem* 3-6 6-4 , 6-1 in an hour and three quarters .
murray was awaiting the winner from the last eight match between tomas berdych and argentina 's juan monaco .
prior to this tournament *thiem* lost in the second round of a challenger event to soon-to-be new brit *aljaz* bedene .

Figure 1: The baseline model reports the wrong score 6-3, substitutes *bedene* for *thiem* and struggles with the uncommon word *assimilation*. The pointer-network models accurately reproduce the out-of-vocabulary words *thiem* and *aljaz*. Note that the final model produces the novel word *defeated* to incorporate several fragments into a single sentence.

Article (truncated): munster have signed new zealand international francis *saili* on a two-year deal . utility back *saili* , who made his all blacks debut against argentina in 2013 , will move to the province later this year after the completion of his 2015 contractual commitments . the 24-year-old currently plays for *auckland-based* super rugby side the blues and was part of the new zealand under-20 side that won the junior world championship in italy in 2011 . *saili* 's signature is something of a coup for munster and head coach anthony foley believes he will be a great addition to their backline . francis *saili* has signed a two-year deal to join munster and will link up with them later this year . ' we are really pleased that francis has committed his future to the province , ' foley told munster 's official website . ' he is a talented centre with an impressive *skill-set* and he possesses the physical attributes to excel in the northern hemisphere . ' i believe he will be a great addition to our backline and we look forward to welcoming him to munster . ' *saili* has been capped twice by new zealand and was part of the under 20 side that won the junior championship in 2011 .

Reference Summary:

utility back francis *saili* will join up with munster later this year .
the new zealand international has signed a two-year contract .
saili made his debut for the all blacks against argentina in 2013 .

Baseline:

dutch international francis UNK has signed a two-year deal to join **irish** UNK super rugby side the blues .
UNK 's signature is something of a coup for munster and his head coach anthony foley believes he will be a great addition to their **respective prospects** .
UNK has been capped twice by new zealand .

Pointer-Generator, No Coverage:

new zealand international francis *saili* will move to the province later this year .
utility back *saili* made his all blacks debut against argentina in 2013 .
utility back *saili* will move to the province later this year .

Pointer-Generator, With Coverage:

francis *saili* has signed a two-year deal to join munster later this year .
the 24-year-old was part of the new zealand under-20 side that won the junior world championship in italy in 2011 .
saili 's signature is something of a coup for munster and head coach anthony foley .

Figure 2: The baseline model incorrectly substitutes *dutch* for *new zealand* (perhaps reflecting the European bias of the dataset), fabricates *irish*, and struggles with out-of-vocabulary words *saili* and *auckland-based*. Though it is not clear why, the phrase *addition to our backline* is changed to the nonsensical *addition to their respective prospects*. The pointer-generator model fixes these accuracy problems, and the addition of coverage fixes the repetition problem. Note that the final model skips over large passages of text to produce shorter sentences.

Article (truncated): right from the moment he breezed through the doors at old trafford , louis van gaal was a man with a plan . the first season , he stated , would see him deliver manchester united back into their rightful place in the champions league . he would restore them to the premier league top four but loftier aims of silverware would have to wait . his three-year vision would allow for such thoughts but , first things first , united needed to be dining from european football 's top table again . louis van gaal is close to delivering his *first-season* aim of returning man united into champions league . wayne rooney smashes home during manchester united 's 3-1 win over aston villa on saturday . united 's win over aston villa took them third , eight points ahead of fifth-placed liverpool in the table . april 12 manchester city (h) . april 18 chelsea (a) . april 26 everton (a) . may 2 west bromwich albion (h) . may 9 crystal palace (a) . may 17 arsenal (h) . may 24 hull city (a) . one season out of the champions league was far from ideal , but two seasons would be an absolute disaster and something , he understood , that would not be tolerated . in november , even that was looking optimistic . a 1-0 defeat to manchester city meant that united had taken just 13 points from their opening 10 matches - it was their worst start to a league campaign since 1986 , when ron atkinson only lasted until november .

Reference Summary:

man united have an eight-point cushion from *fifth-place* liverpool .
van gaal looks likely to deliver on his promise of top four finish .
but the dutchman has a three-year vision mapped out .
next season will have to see united mount sustained challenge for title .
they must also reach the later stages of the champions league .

Baseline:

manchester united beat aston villa 3-1 at old trafford on saturday .
louis van gaal is close to delivering his UNK aim of returning man united into the premier league top four .
louis van gaal is close to delivering his UNK aim of returning man united into champions league .

Pointer-Generator, No Coverage:

louis van gaal is close to delivering his *first-season* aim of returning man united into champions league.
united 's win over aston villa took them third , eight points ahead of fifth-placed liverpool in the table .
louis van gaal is close to delivering his *first-season* aim of returning man united into champions league.

Pointer-Generator, With Coverage:

manchester united beat aston villa 3-1 at old trafford on saturday .
louis van gaal is close to delivering his *first-season* aim of returning man united into champions league .
united needed to be dining from european football 's top table again .

Figure 3: In this example, both our baseline model and final model produce a completely abstractive first sentence, using a novel word *beat*.

Article (truncated): having been on the receiving end of a 6-1 thumping , a defeat like that could be justifiably met with a backlash by angry supporters . watching a 3-1 first leg aggregate advantage turn into a 7-4 deficit come the end of the reverse encounter too could send many fans *apoplectic* at the capitulation of their side . however that does n't appear the case for those devoted to porto . porto supporters gave their team a hero 's welcome following their 6-1 defeat at bayern munich on tuesday . porto star striker jackson martinez was one of many players to look perplexed by their warm reception . porto boss julen lopetegui (left) was hugged by fans congratulating him on their champions league run . police escorts were needed to keep the delirious supporters at bay as the porto team bus drove past . the team bus was met with a cacophony of noise from porto supporters proudly chanting about their club . on their return from a humiliating champions league quarter-final loss at the hands of bayern munich on tuesday night , the squad were given a heroes reception as they arrived back in portugal . in the early hours of wednesday morning , fans mobbed the squad congratulating them on their run in the tournament . star striker jackson martinez and ricardo quaresma were one of many porto players who looked perplexed as they were hugged by fans before they making their way on to the team bus - set upon a cacophony of *fiercely-proud* chanting . it was the first time that porto , who had been unbeaten in this season 's tournament up until tuesday night , had reached the quarter-finals of the champions league since the 2008-09 season .

Reference Summary:

bayern munich beat porto 6-1 in their champions league tie on tuesday .
result saw bayern win quarter-final encounter 7-4 on aggregate .
it was the first-time porto had reached that stage since the 2008-09 season .

Baseline:

porto **beat** bayern munich **2-0** in the champions league on tuesday night .
porto star **james** UNK was one of many players involved in the match .
the squad were given a **trophy** as they arrived back in portugal .

Pointer-Generator, No Coverage:

porto star striker jackson martinez was one of many players to look perplexed by their warm reception.
porto star striker jackson martinez was one of many players to look perplexed by their warm reception.
porto star striker jackson martinez was one of many players to look perplexed by their warm reception.

Pointer-Generator, With Coverage:

porto star striker jackson martinez was one of many players to look perplexed by their warm reception .
porto boss julen lopetegui was hugged by fans congratulating him on their champions league run .
however that does n't appear the case for those devoted to porto .
police escorts were needed to keep the delirious supporters at bay .

Figure 4: The baseline model makes several factual inaccuracies: it claims *porto* beat *bayern munich* not vice versa, the score is changed from 7-4 to 2-0, *jackson* is changed to *james* and a *heroes reception* is replaced with a *trophy*. Our final model produces sentences that are individually accurate, but they do not make sense as a whole. Note that the final model omits the parenthesized phrase (*left*) from its second sentence.

Article: (cnn) ” it ’s showtime ! ” michael keaton paid homage – ever so slightly – to his roles in “ *beetlejuice* ” and “ batman ” in his third turn hosting “ saturday night live ” this weekend . keaton acknowledged in his opening monologue that a lot has changed since he first hosted the comedy sketch show in 1982 . “ i had a baby – he ’s 31 . i also have a new girlfriend – she ’s 28 , ” he said . fans who were hoping for a full-blown revival of keaton ’s most memorable characters might have been a little disappointed . snl cast members *taran killam* and bobby moynihan begged the actor with a song to “ play ” batman and *beetlejuice* with them . all they got in response were a couple of one-liners . overall , keaton ’s performance drew high marks from viewers and critics for its “ deadpan ” manner and “ unpredictable *weirdness* , ” in the words of *a.v . club* ’s dennis perkins . fans also delighted in a cameo from “ walking dead ” star norman *reedus* during weekend update . keaton scored some laughs from the audience as an ad executive who ’s not very good at his job , a confused grandfather and a high school teacher who gets asked to the prom in a riff on the romantic comedy “ she ’s all that . ” other *crowd-pleasing* spots included a scientology parody music video and a news conference *spoofing* the ncaa *student-athlete* debate . the show also poked fun at cnn with cast member cecily strong playing anchor brooke baldwin . baldwin said on twitter that she ’s taking it as a “ crazy compliment ” and shared a clip from the skit .

Reference Summary:

michael keaton hosted “ saturday night live ” for the first time in 1982 .
in 2015 , his nods to starring roles in “ *beetlejuice* ” and “ batman ” are brief .

Baseline:

“ snl ” wins “ saturday night live ” .
keaton acknowledged in his opening “ saturday night live ” .
keaton acknowledged in his opening night ’s “ UNK ” .
the show also pokes fun at cnn with cast member **mariah carey** .

Pointer-Generator, No Coverage:

“ *beetlejuice* ” michael keaton paid homage to his roles in “ *beetlejuice* ” and “ batman ” in his third turn hosting “ saturday night live ” this weekend .
keaton acknowledged in his opening monologue that a lot has changed since he first hosted the comedy sketch show in 1982 .

Pointer-Generator, With Coverage:

michael keaton paid homage to his roles in “ *beetlejuice* ” and “ batman ” in his third turn hosting “ saturday night live ” .
keaton acknowledged in his opening monologue that a lot has changed since he first hosted the comedy sketch show in 1982 .

Figure 5: Baseline model replaces *cecily strong* with *mariah carey*, and produces generally nonsensical output. The baseline model may be struggling with the out-of-vocabulary word *beetlejuice*, or perhaps the unusual non-news format of the article. Note that the final model omits – *ever so slightly* – from its first sentence.

Article (truncated): they are supposed to be the dream team who can solve the conundrum of how to win the election . but david cameron and boris johnson were left scratching their heads today as they struggled with a children 's jigsaw teaching toddlers about the seasons . as the london mayor tried to hammer ill-fitting pieces together with his hands , the prime minister tried out what could be a new election slogan , telling him : ' if in doubt , wedge it in . ' after being put right by a four-year-old who spotted their errors , the pair had more fun finger painting with tory blue paint . david cameron and boris johnson were left stumped by the puzzle at advantage children 's day nursery in *surbiton* , as three-year-old stephanie looked on . when they tried to put the puzzle back together , they hit trouble after it proved to be more difficult than expected . the conservative duo made their first appearance together on the campaign trail with a visit to advantage day nursery in *surbiton* , south west london . they were supposed to be highlighting tory plans to double free childcare for 600,000 children aged three and four . they sat at a table with joshua and stephanie , both aged three , and four-year-olds hamish and leo where they broke up a puzzle which depicted the four seasons . when they tried to put it back together , they hit trouble after it proved to be more difficult than expected .

Reference Summary:

david cameron and boris johnson visit nursery to promote childcare .
duo left *flummoxed* by jigsaw aimed at teaching children about seasons .
london mayor resorted to brute force to hammer wrong pieces together .
prime minister gave his approval , telling boris : ' if in doubt , wedge it in ' .

Baseline:

david cameron and boris johnson were left mystified by the puzzle .
they were at the nursery in UNK to promote a tory pledge to double free childcare for 25 children aged three and four .
the pair were at the nursery in UNK to promote a tory pledge to double free childcare for children aged three and four .

Pointer-Generator, No Coverage:

london mayor tried to hammer ill-fitting pieces together with his hands .
they were supposed to be highlighting tory plans to double free childcare .
they were supposed to be highlighting tory plans to double free childcare .
they were supposed to be highlighting tory plans to double free childcare .

Pointer-Generator, With Coverage:

london mayor tried to hammer ill-fitting pieces together with his hands .
prime minister tried out what could be a new election slogan .
but they hit trouble after it proved to be more difficult than expected .

Figure 6: The baseline model appropriately replaces *stumped* with novel word *mystified*. However, the reference summary chooses *flummoxed* (also novel) so the choice of *mystified* is not rewarded by the ROUGE metric. The baseline model also incorrectly substitutes *600,000* for *25*. In the final model's output we observe that the generation probability is largest at the beginning of sentences (especially the first verb) and on periods.

Article (truncated): lagos , nigeria (cnn) a day after winning nigeria 's presidency , *muhammadu buhari* told cnn 's christiane amanpour that he plans to aggressively fight corruption that has long plagued nigeria and go after the root of the nation 's unrest . *buhari* said he 'll “ rapidly give attention ” to curbing violence in the northeast part of nigeria , where the terrorist group boko haram operates . by cooperating with neighboring nations chad , cameroon and niger , he said his administration is confident it will be able to thwart criminals and others contributing to nigeria 's instability . for the first time in nigeria 's history , the opposition defeated the ruling party in democratic elections . *buhari* defeated incumbent goodluck jonathan by about 2 million votes , according to nigeria 's independent national electoral commission . the win comes after a long history of military rule , coups and botched attempts at democracy in africa 's most populous nation .

Reference Summary:

muhammadu buhari tells cnn 's christiane amanpour that he will fight corruption in nigeria . nigeria is the most populous country in africa and is grappling with violent boko haram extremists . nigeria is also africa 's biggest economy , but up to 70 % of nigerians live on less than a dollar a day .

Baseline:

UNK UNK says his administration is confident it will be able to **destabilize nigeria 's economy** . UNK says his administration is confident it will be able to thwart criminals and other **nigerians** . **he says the country has long nigeria and nigeria 's economy** .

Pointer-Generator, No Coverage:

muhammadu buhari says he plans to aggressively fight corruption in the northeast part of nigeria . he says he 'll “ rapidly give attention ” to curbing violence in the northeast part of nigeria . he says his administration is confident it will be able to thwart criminals .

Pointer-Generator, With Coverage:

muhammadu buhari says he plans to aggressively fight corruption that has long plagued nigeria . he says his administration is confident it will be able to thwart criminals . the win comes after a long history of military rule , coups and botched attempts at democracy in africa 's most populous nation .

Figure 7: The baseline model incorrectly changes *thwart criminals and others contributing to nigeria's instability* to *destabilize nigeria's economy* – which has a mostly opposite meaning. It also produces a nonsensical sentence. Note that our final model produces the novel word *says* to paraphrase *told cnn 's christiane amanpour*.

Article: cairo (cnn) at least 12 people were killed sunday , and more injured , in separate attacks on a police station , a checkpoint and along a highway in egypt 's northern sinai , authorities said . six people , including one civilian , were killed when a car bomb exploded near the police station in *al-arish* , capital of north sinai , health ministry spokesman *hossam abdel-ghafar* told ahram online . he said 40 people were injured . ansar beit *al-maqdis* , an isis affiliate , claimed responsibility for the attack , which came hours after another operation that the group also claimed . in that earlier attack , a first lieutenant , a sergeant and four *conscripts* were killed when their armored vehicle was attacked on the highway from *al-arish* to sheikh *zuweid* in northern sinai , the military said . two other soldiers were injured and taken to a military hospital . ansar beit *al-maqdis* has claimed many attacks against the army and police in sinai . a third attack sunday on a checkpoint in rafah left three security personnel injured , after unknown assailants opened fire at them , according to state media . the attacks come as the military announced a reshuffle of several senior military positions , state media reported . among those being replaced are the generals in charge of military intelligence and egypt 's second field army , which is spearheading the battle against the insurgents in the northern sinai . egypt 's army has been fighting a decade-long militant islamist insurgency , which has spiked since the ouster of muslim brotherhood president mohamed morsy in the summer of 2013 . hundreds of police and soldiers , as well as civilians , have been killed in militant attacks in the past months . ian lee reported from cairo . anas hamdan reported from atlanta .

Reference Summary:

six people , including one civilian , are killed when a car bomb explodes near a police station . six others are killed when their armored vehicle is attacked on a highway in northern sinai . ansar beit *al-maqdis* , an isis affiliate , claims responsibility .

Baseline:

he says the attacks come after another operation that killed 12 . the attacks come as military announced a **u.n. peacekeeping force** in northern sinai .

Pointer-Generator, No Coverage:

ansar beit *al-maqdis* , an isis affiliate , claimed responsibility for the attack .
ansar beit *al-maqdis* , an isis affiliate , claimed responsibility for the attack .
the attacks come as the military announced a reshuffle of several senior military positions .

Pointer-Generator, With Coverage:

six people , including one civilian , were killed when a car bomb explodes near the police station .
ansar beit *al-maqdis* , an isis affiliate , claimed responsibility for the attack .
egypt 's army has been fighting a decade-long militant islamist insurgency .

Figure 8: The baseline model fabricates a completely false detail about a *u.n. peacekeeping force* that is not mentioned in the article. This is most likely inspired by a connection between U.N. peacekeeping forces and *northern sinai* in the training data. The pointer-generator model is more accurate, correctly reporting the *reshuffle of several senior military positions*.